

COAL AGE

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John and the Ton of Rock

ON a certain payday in March John James paid \$36.50 to a representative of "The Fatherless Children of France, Branch of the American Society for Relief of French War Orphans." This amount, he had been told, would keep a fatherless French child one year. In due time John received a letter from France, which his French neighbor translated as follows:

Dear American:

My mother and I salute you. My father was killed in battle. They say he had to make a defense on one of the days when there was not enough ammunition, so he did not have a chance, but he was very brave. My mother works every day as a laborer, as there are not enough men now to do the work that must be done. She is not strong, so has a hard time of it; but she says the Americans are so patriotic and will change all of these things soon. I will pray that you may help us and that we may thank you as we should.

MARIE.

That night John had a dream.

During the day he had loaded something like 300 pounds of rock into every car of coal that he sent to the top. Since the demand for coal had become so acute dockage rules were like scraps of paper and there were few who paid much attention to them. Seven cars of coal John loaded that day, and the rock in these cars amounted to about one ton.

In the dream it was exactly one ton of rock, and floating above it was a large banner calling attention to the fact that here was a ton of rock. On the other side of the banner was the legend, "Hoch the Kaiser,

HE LOADED A TON OF ROCK



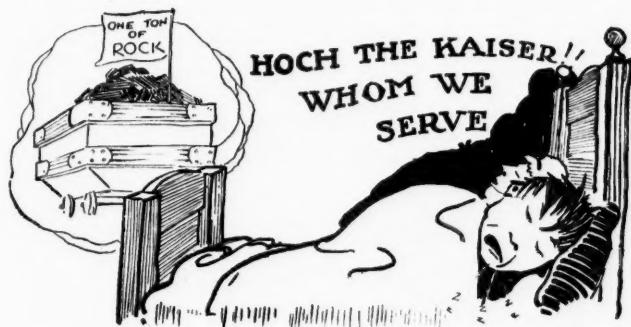
whom we serve." As John looked at the banner, first one side was visible and then the other—the reference to rock on one side, the legend about the Kaiser on the other.

That Kaiser stuff didn't appeal to John, even in a dream. He made a lunge at the banner, but the mass of rock blocked him.

"You put me here," said the ton of rock. "I was in your power then, now I'm out of your power. Half of me will get into a railroad locomotive tomorrow, and because of me the fireman will lose his steam; his train will be delayed three hours. Think what that means to friend Kaiser, with freight congested as it is now and not enough men to handle it. All of your women will soon be at work. The other half of me will be sent to a coke oven to be turned into blast-furnace coke. My, but that blast furnace will cut up when that coke gets dumped into it! Furnaces can't melt iron with rock. Maybe friend Kaiser won't like that, also; the iron from that furnace goes to a steel works and then into ammunition."

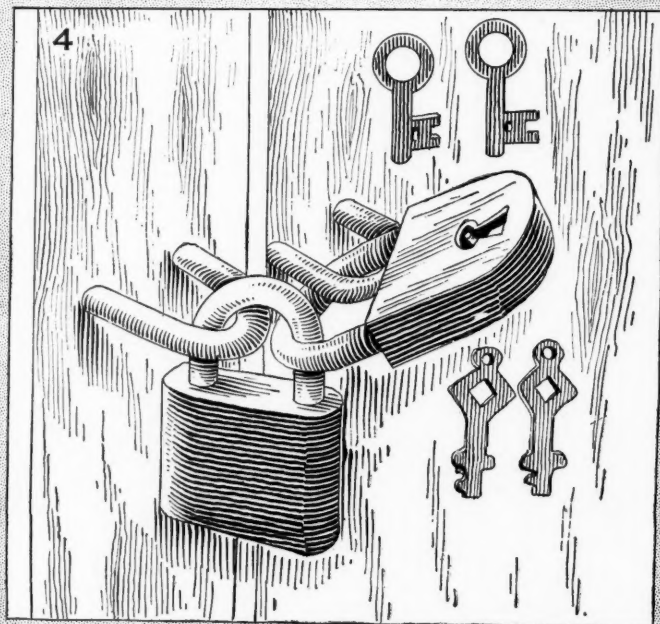
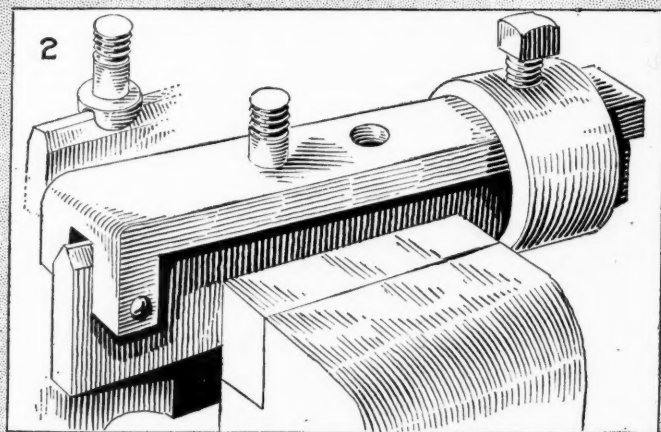
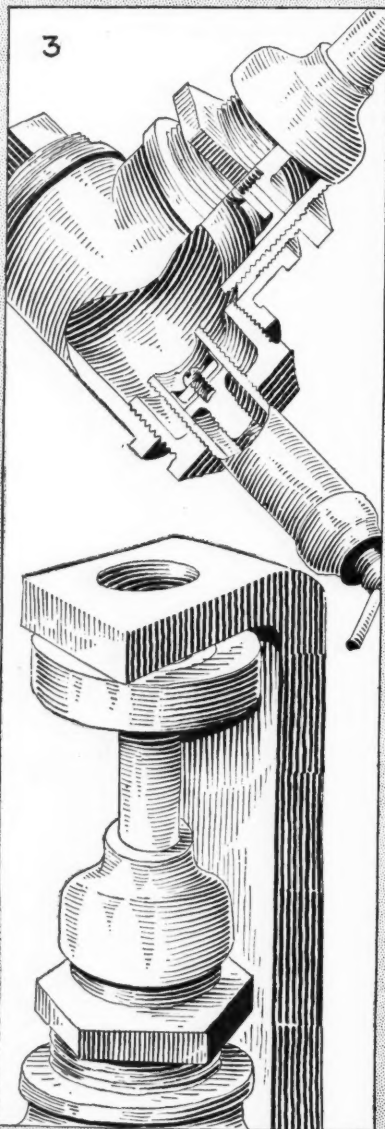
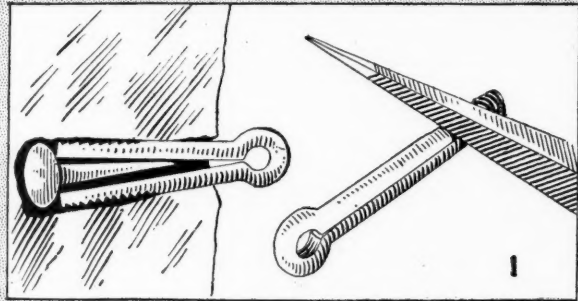
With that the pile of rock seemed to melt away, and in its place stood only the banner; but the wording on the banner had changed. Now it ran: "You Americans are so patriotic."

Just then John frightened his sleeping wife almost out of her senses by springing up in bed, yelling frantically, "To Hell with the Kaiser and all who serve him."

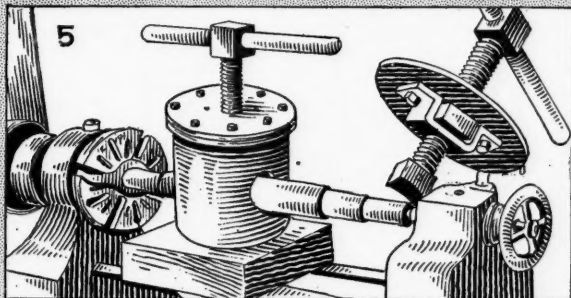


IDEAS AND SUGGESTIONS

1. Cotter pin and nail make fine expansion bolt.
2. Holds machine screws tight without marring.
3. Small hydraulic press.
4. Four men have access to locker by this arrangement.



KINKS FOR USE AROUND THE MINE

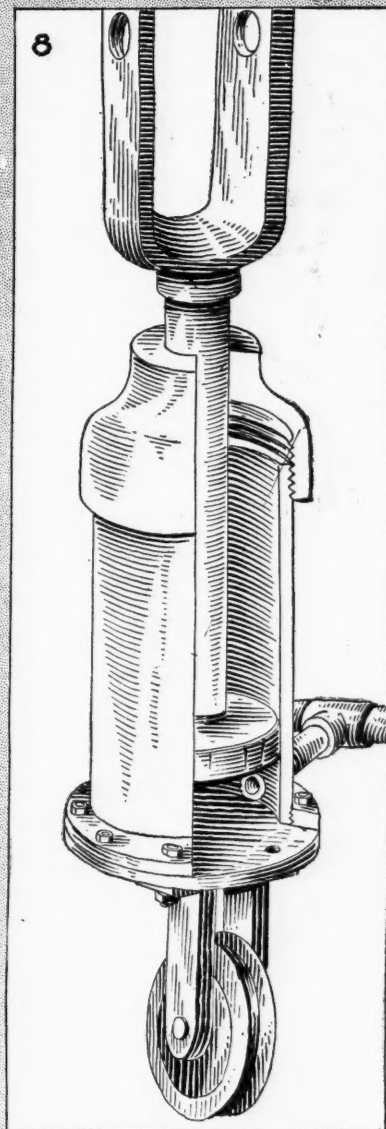
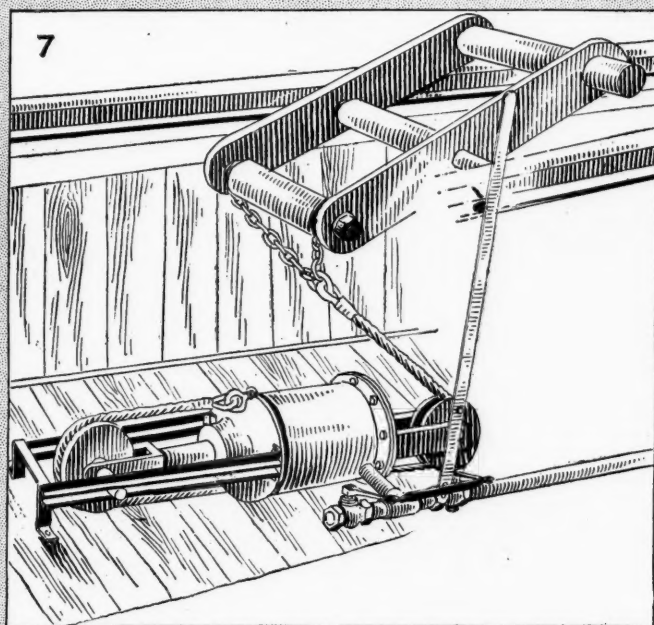
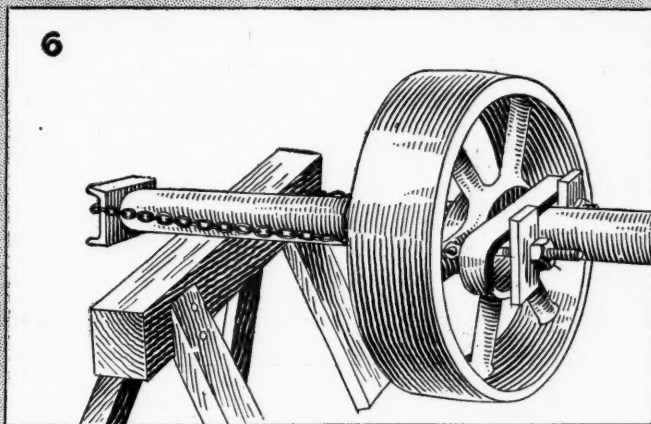


5. Axle straightening device.

6. Simplifies removal of pulley.

7. Car hoist made of pipe fittings.

8. The cylinder and piston.



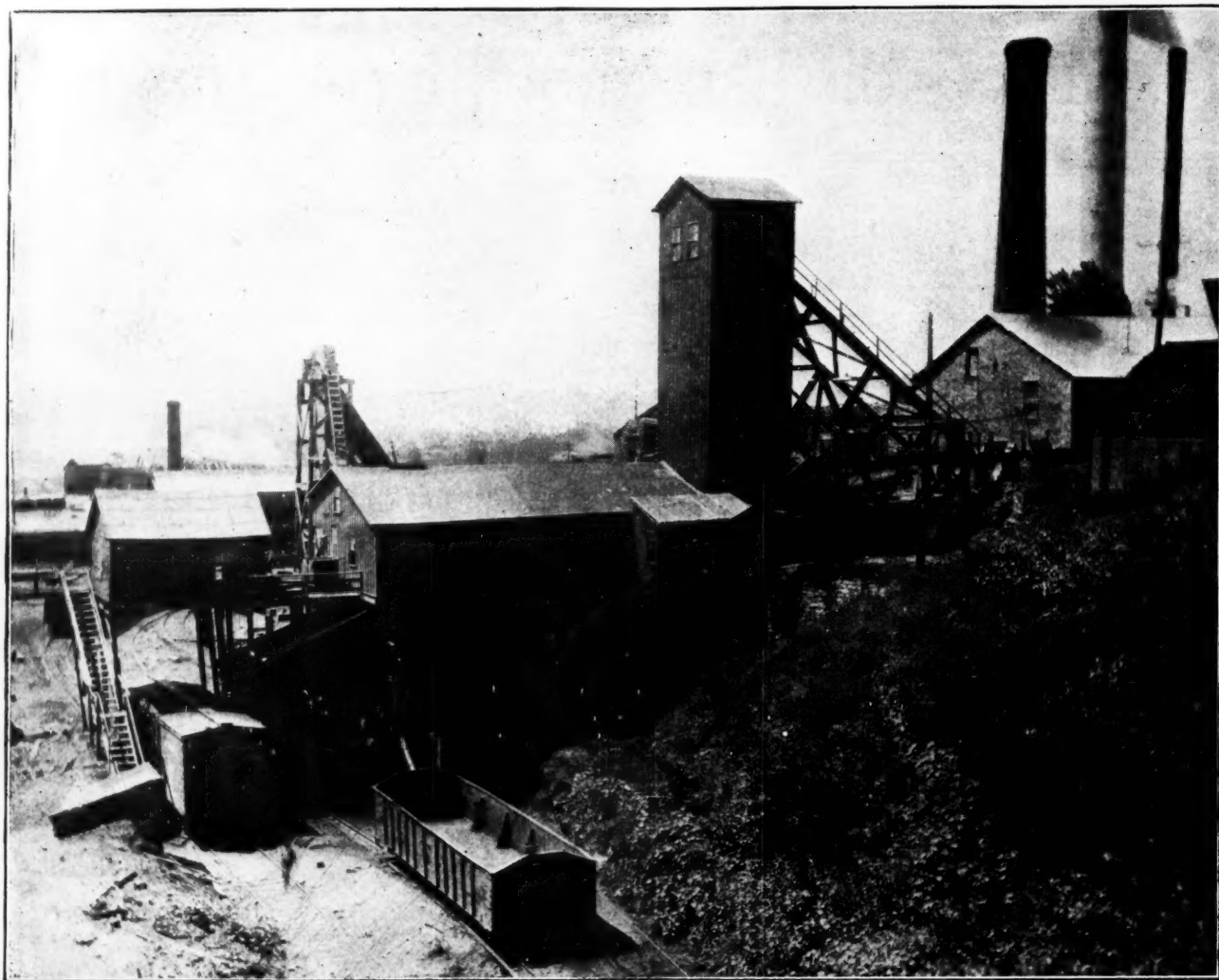


FIG. 1. UNION MINE OF THE LA SALLE COUNTY CARBON COAL CO. IN ILLINOIS

Machine Mining at La Salle, Illinois

By GEORGE W. HARRIS
Editorial Staff "Coal Age"

INDIVIDUAL preference in mining should not be challenged any more than a person's choice of political parties or any other matter about which people differ. Some men prefer to work in a three or four-foot seam, longwall mine rather than in an eight to ten-foot room-and-pillar mine. They become accustomed to the longwall top doing the hard work of breaking down the coal for them and appreciate the good, clear air always sweeping along the working face. Many times longwall men leave their jobs only to return to them again in a short time. If the arduous task of undercutting the coal is done by machinery, then the work of mining is largely reduced to loading the coal into cars, taking care of the top at the face and building pack walls on the part of the longwall miner, or "loader," as he then is called.

One of the best-known longwall regions in the country is in the northern part of Illinois, and here this method of mining reaches its greatest development in Bureau and La Salle counties. It is of historical interest to note in this connection that the first mention of coal

in the country which afterward became the United States was in the Illinois River territory. At the end of June, 1917, there were only 14 longwall commercial shipping mines in the first inspection district of Illinois, and their tonnage was only about 2½ per cent. of the total produced by the state.

Nevertheless, there are some important mines in this section, and among these are the four plants of the La Salle County Carbon Coal Co. These four plants produced over half a million tons of coal in the year ended June 30, 1917, out of a county production of 885,774 tons. The La Salle company uses Sullivan "Ironclad" longwall mining machines at two of its plants—those which have reached the greatest development. A description of the La Salle plant of this company, together with notes about longwall mining, appeared in the Aug. 8 issue of *Coal Age*.

An illustration showing the Union plant of the La Salle County Carbon Coal Co. is given in Fig. 1. This mine was opened in 1874 and is in Peru, at the west end of the town of La Salle. The newer construction at this

plant is plainly evident in the masonry engine house, the boiler-house stacks and the steel concrete fan. The wooden tippie is probably a survival of the day of timber structures. One of the latest plants of this company, its No. 5 mine, has a fine steel tippie.

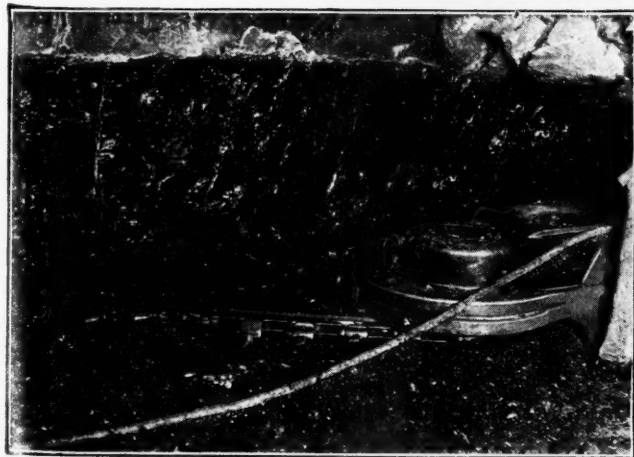
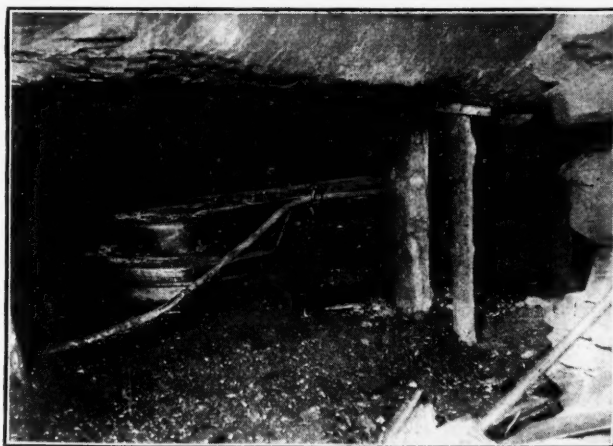
At the Union, as well as the La Salle mine, undercutting is done by Sullivan longwall machines, which are shown at work in the mine in Figs. 2, 3 and 4. The seam here averages about 40 in. in height and the undercut is made in the coal. Longwall machine mining is of comparatively recent development in the United States, and it has been stated by one thoroughly acquainted with coal-mining conditions in Illinois that machines will lengthen the life of the longwall field. A few years ago it seemed as if the thin coal field would have a limited life on account of the cost of mining. The introduction of machinery has turned the scale on many other occasions in mining.

Longwall mining machines are made less than 18 in. in height and of a width permitting them to pass inside props set 30 in. from the face. Years ago the chain had three cutter positions; today it has nine in certain types. These longwall machines require no guide rails or props to hold them up to the working face, and they exert no side pressure on roof props, thus eliminating the danger of falling props due to side pressure of the machines. The anchor jack ahead of the machine is usually sufficient support for the chain which constitutes the feed system while the machine is at work. Figs. 3 and 4 show a machine working under bad top. In Fig. 2 the top seems to have held up at least long enough for the cut to have been made. These illustrations represent the working face at the end of a room or haulage-way. In Figs. 3 and 4 the top rock either broke flush with the coal or it was in such shattered condition that it was taken down as a matter of safety. At the right side of Fig. 3 the top

seems to be so loose that it might fall at any minute. The chain-feed system of handling longwall machines at times constitutes an element of safety for the machine runner. Thus, in Fig. 3, it may be possible for the machine to proceed by itself, to travel without attention from the runner for a time, or until that portion where the roof is exceptionally broken is passed. The runner may follow it after it has passed the danger point or meet it at the next opening. Also, it is stated that the narrowness and solid construction of the cutter bar make it possible to readily free the bar when jammed by falling coal due to roof pressure. Occasionally the top drops down in a solid mass at the face and it may be necessary to dig out a way back of the fall to allow the mining machine to get by.

The scheme of permitting the machine to proceed unattended would be effective only where there would be no interruption to the steady running of the machine. In the mines of northern Illinois sulphur balls and bands are found in the No. 2 seam and destruction of bits occurs at times when sulphur is encountered. At other times a machine runs along steadily for some distance without the bits having to be changed.

A number of details of machine operation and methods of mining are apparent in Figs. 2, 3 and 4. In Fig. 3 the machine is shown sumping under at a room or haulageway. The cutter bar is partly under the coal; and the method of cutting under to begin work is indicated. In Fig. 4 the machine is emerging from behind the gob and pack wall into view at a room; the runner is at his post at the operating end of the machine, holding the power lever in his right hand. He should keep the machine in the right position relative to the seam, blocking it up with loose coal or rock when necessary on account of uneven bottom. The positions of the feed chain and power cable relative to the machine while in operation are quite clearly indicated.



FIGS 2, 3 AND 4. SULLIVAN IRONCLAD LONGWALL MINING MACHINE AT THE WORKING FACE IN UNION MINE

Fig. 2—Machine under fair top. Fig. 3—Machine sumping under. Fig. 4—Forward or operating end of machine with runner at his post.

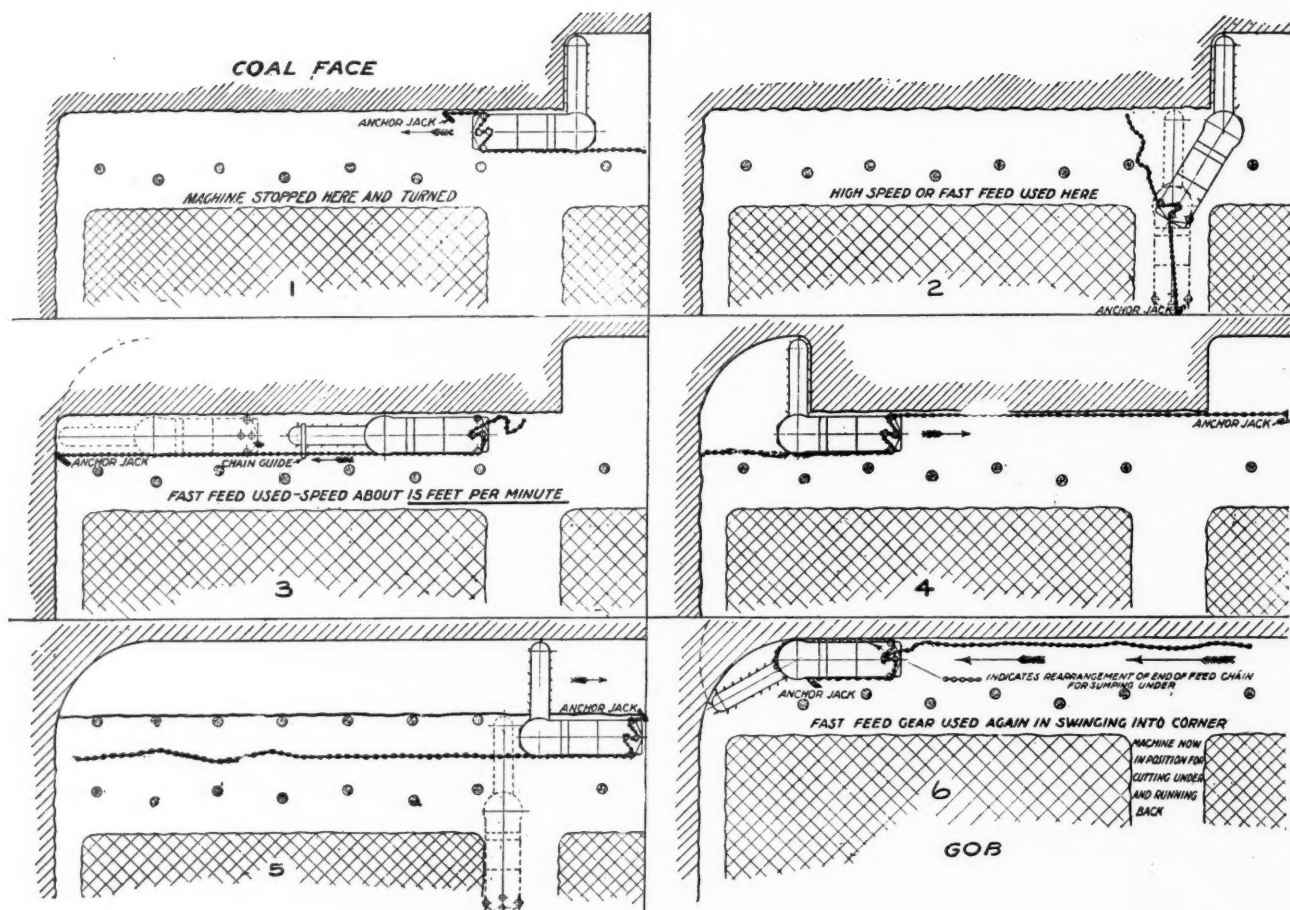


FIG. 5. VARIOUS POSITIONS OF A LONGWALL MINING MACHINE UNDERCUTTING A CORNER IN A MINE

In Fig. 5 is shown one of several methods of undercutting a corner with a longwall mining machine. The cutter bar is arranged so that it can swing through an arc of 190 deg. It may be sumped or cut under the coal with the cutter bar in line with the body of the machine. Under its own power and by manipulation of the feed chain and regular feed, the cutter bar can be swung around into various positions, some of which are shown in Fig. 5. When cutting in either direction the main part or body of the machine travels in advance of the cutter bar. The controlling levers are operated from the front end of the machine, as shown in Fig. 4. The runner also largely controls the movement of the cutter bar, giving it a slight inclination either above or below the horizontal position by blocking up or removing loose material from under the main body of the machine.

Longwall mining has been employed for many years in Great Britain and on the continent, but it has never attained wide popularity in the United States on any extensive scale. It has been confined to a comparatively few localized districts in this country, but its use is likely to be extended as its applicability to the mining of thin seams becomes better known and miners get more accustomed to longwall methods. Longwall mining machines were introduced into Great Britain a number of years ago, and this system of undercutting coal has made rapid advances in British mines. But it is only recently that machine mining has gained much of a foothold in longwall workings in the United States. For many years there has been

a determined effort on the part of operators to produce a greater percentage of the larger sizes of coal and reduce the amount of screenings attendant upon both mining and preparation. This incentive and the increasing tendency to utilize machinery about the mines at every possible vantage point indicates a further extension of undercutting machines in longwall work.

For the excellent illustrations accompanying this article *Coal Age* is indebted to the courtesy of the Sullivan Machinery Co., of Chicago, Ill., and to Adam Currie, the superintendent of the La Salle County Carbon Coal Co., through whose assistance the photographs were taken.

Distillation at low temperatures favors the formation of light hydrocarbons of the paraffin series which contain more hydrogen and less carbon than the hydrocarbons of the aromatic group, which are distilled at high temperature. The hydrocarbons of the paraffin series are more stable at high temperatures and on account of their higher hydrogen content are more apt to burn completely without depositing soot than the compounds containing more carbon. It requires one molecule of oxygen to burn completely one atom of carbon, whereas one molecule of oxygen burns completely four atoms of hydrogen. Thus of two compounds having the same number of atoms in a molecule, the one having more hydrogen requires less oxygen for its combustion, and therefore, in the same concentration of oxygen will burn more readily.

What Is the Matter with the Miner?

By A. H. STOW
Pocahontas, Va.

SYNOPSIS—*Why does not the miner load more coal? The average coal digger will produce enough coal ordinarily to enable him to live in his accustomed style, but little more. If the haulage can be so planned that no loader is compelled to wait for cars, he can perform his self-apportioned stint in a short time and may even be induced to raise his standard of a day's work.*

THE question on everyone's lips, the burning question of the hour, is "What is the matter with the miner?" He is certainly paid enough, it is unquestionably his patriotic duty to work, and yet neither of these considerations appears to incite him to mine out more coal. Nevertheless, a simple and natural explanation for this attitude occurs to one familiar with the entire situation. The miner, by dint of industry, could unquestionably double, or nearly double, his earnings of a year ago. Yet were he to double his wages, life, to the average miner, would not be materially brightened thereby, strange as this may seem to the factory worker of the large cities or to the public in general.

In the larger cities, the pleasure that one can get out of life is largely measured by the amount of money that he can get to spend. This, in the average mining camp, is anything but true. The pleasures in the average mining camp are almost too entirely negligible to be worth enumeration. To anyone familiar with the miner's work and with the conditions under which he labors, it is entirely clear that the miner gets about as much pleasure out of a holiday with his friends or with his family, as the case may be, as it is possible for him to get under the circumstances.

MINER IS ACTUATED BY SELFISH MOTIVES

From a patriotic standpoint, the miner has not an inch of ground to stand on, so to speak, for not putting his shoulder to the wheel in this critical period. But in the districts remote from the larger cities, which include practically all the mining camps, the people have not awakened to the realization of the seriousness of the situation. Naturally, under these circumstances, the miner is largely actuated by purely selfish motives.

There have been wonderful strides made recently in improving the living conditions around the mines. Within the last few years the improvements in dwellings and in the mining camps generally, owing to the keen competition to secure labor, has been almost startling; and yet, necessarily, the camps are in small isolated communities that do not admit of as large a variety of amusements as the larger cities.

The improvements in the mines have also been equally marked. The mule has been largely superseded by the latest and most carefully designed haulage locomotives. Attempts have also been made, with some degree of success, to improve the mine cars. Speaking generally, the improvements seem almost amazing to one familiar

with the conditions that prevailed a few years ago. More, of course, can be done along the lines indicated, and the betterments made by the larger and more progressive companies will no doubt become more general.

However, there is one essential factor that does not appear to have received the attention that it demands or deserves—and a chain is no stronger than its weakest link. The factor referred to is secondary mine haulage. It is not to be inferred that secondary mine haulage is of itself more important than other problems; it is merely that the question of secondary mine haulage today has not received the same amount of attention as other important matters. Naturally, therefore, secondary mine haulage has not shown progress.

ADVANTAGES OF SECONDARY MINE HAULAGE

Until comparatively recently, labor has been in excess of the demand. When this condition prevails, the minimum cost of secondary mine haulage is attained when a sufficiently large number of miners are on any given secondary haul, so that the mule driver or the motorman can always find a loaded car ready almost anywhere. This necessarily means that the miner spends a considerable time waiting for cars instead of being at work. Under the conditions in which the miner lives, it is the number of hours he has to spend underground rather than the actual amount of work done in those hours that he considers a day's work.

With a smaller number of miners on any given secondary mine haul than would be good practice with an excess of labor, the mule driver or motorman occasionally has to wait on the miner to load cars. This results in a somewhat uneconomical secondary haulage cost, and yet it reduces the number of hours that are necessary for the miner in that particular section to stay underground in order to load a given number of cars. Under present conditions this is an important item.

Under normal conditions the increased cost of the secondary mine haulage just referred to can largely be obviated; first, by an ample supply of mine cars, and second, by ample storage space for cars at the gathering parting. Under present conditions it is impossible to make substantial improvements of this kind.

Reducing the average number of miners on the secondary haulage means increasing the number of gathering units, and to add to the number of gathering motors at this time is a serious proposition. For a group of five mines, however, putting one on a mule-haulage basis would give one extra gathering locomotive for the remaining four of the mines—that is, assuming this mine previously had four gathering motors.

Were all mines to make exactly the same improvements along the lines indicated, the result would probably be the same as has accrued from a uniform increase in wages to everyone. The improvements suggested in actual practice are anything but simple and require intelligent handling in order to get results.

Suppose, for example, one mine among a group can materially reduce the amount of time necessary for the

miner to stay underground in order to load the average number of cars requisite for reasonable, comfortable living. When this has been demonstrated to the entire satisfaction of the miners of that mine, the management has a grip on the employees that can be used to material advantage if handled intelligently.

Let us suppose that, at the mine under consideration, a miner can load eight cars in the same time that is required to load five at adjacent mines. The chances are that for the reasons previously given the miner would prefer to load only the five cars, assuming, of course, that it requires only the five cars to afford him the comfort and pleasures in living that he has been accustomed to. However, it is also probable that rather than lose his place at the mine where he can load coal quickly, he will be willing to load six or seven cars.

Unquestionably the improvements suggested mean an increased cost of operation, insofar as the secondary mine haulage in itself is concerned. On the other hand, if the production of a given mine could be augmented through the increased average loading per man, the total average mining costs would be reduced automatically.

Liquid Oxygen Explosives

The Germans have devoted considerable attention to the use of liquid air for blasting purposes, and the Springluft Gesellschaft s.b.H. possesses plants capable of supplying 22 lb. of rectified liquid oxygen per hour, at a net cost of less than one penny per pound. The liquid oxygen is stored in a modified dewar flask, usually of brass or thin steel, the jacket space being filled with charcoal, which absorbs any small amount of gas escaping through the pores of the metal. In utilizing the liquid oxygen for blasting, lampblack has been found the most satisfactory combustible material. Cartridge cases of cardboard are filled with the lampblack, and then immersed for some time in a tank containing the liquid oxygen, so that they become thoroughly impregnated just before use. They are usually fired by a small primer, preferably ignited by electricity. Oxyliquite is stated to be efficient for mining work on account of its *brisant* qualities, but is less suitable for quarry work. It is considered safer than the explosives generally used, since the cartridge is only explosive for 10 minutes after saturation with oxygen.



Coal will win the War

THE COAL ARMY

Written expressly for COAL AGE
by BERTON BRALEY

The Trapper

I'm only a kid at a swingin' door
Who's lettin' the coal cars through;
But I guess I'm helpin' to win the war.
I'm doin' my best—an' I can't do more;
I'm right on the job, are you?

The Pumpman

I keep my pumps a-runnin' an' drive the water out
So men can do their duty, from collar to the sump;
I'm helpin' lick the Germans, there isn't any doubt,
By stickin' like a soldier, a soldier at the pump.

The Shaftman

I'm one of the shaft division, who's keepin' the
cables fit
An' watchin' the plates an' timbers, an' seein'
that things is right;
For doin' my daily labor is part of my soldier's bit,
I'm one of the coal mine army, that's helpin' to
win the fight;
By lookin' the long shaft over, an' tendin' to its repair
I'm backin' the boys in khaki who're riskin' it
"over there."

The Hoisting Engineer

Hand upon the lever, eye upon the drum,
Snatchin' up the loaded cars, droppin' empties back,
That's the job they pay me for, makin' cages hum,
Helpin' put the Kaiser an' his army on the bum!
Coal to make munitions that'll hit the Hun a crack,
That's the stuff I'm bringin' up, hoistin' from the mine,
Hand upon the lever, eye upon the drum,
Backin' up the soldiers in the fightin' line!

In the Breaker

Seem's like we're nearer to the front, we boys.
Than other guys who work around the coal.
You see the breaker makes a lot of noise
Rumblin' like cannons where the battles roll.
So we kin think we're soldiers in the war
Fightin' against the dirt an' waste an' slate.
Yes, that's the duty that we're put here for,
An' we can help by tendin' to it, straight!

The Miner

I'm a sapper, diggin' deep to get the coal,
I'm a first or second cousin to the mole,
An' my job is to attack
All the coal seams, rich an' black
An' to make old Mother Nature pay her toll;
So I arms myself with powder-stick an' drill,
An' I works with all my cunning an' my skill,
For we've got to win, it's clear,
An' a miner, over here,
Has to do his share in lickin' Kaiser Bill!



Do your share in lickin' Kaiser Bill

Rewinding and Testing Direct-Current Locomotive Armatures

BY FRANK HUSKINSON

Lafayette, Colo.

THE average mine electrician is familiar with the rewinding and testing of direct-current armatures, but at the same time I believe that practical men are at all times ready and willing to read a description of the methods and "stunts" employed by the other fellow. It has always been my policy to pass information along, and I feel confident that this short article will not only be welcomed, but that it is needed to clear up mental cobwebs and prevent the rust from accumulating.

A familiar scene is shown in Fig. 1. This is a W-H No. 58 locomotive armature ready for rewinding. In Fig. 2 the same armature is shown partly rewound. Take a glance at old "Long Tom," Fig. 3. This is a Goodman 10-ton locomotive armature, partly rewound, one of the oldtimers. In the foreground of Fig. 4 we have a Crocker-Wheeler 7½-hp. pump motor armature, ready for rewinding, while in the background may be seen a Jeffrey and a Goodman locomotive armature stripped of all coils.

The windings used in direct-current armatures may be divided into two classes—multiple or lap winding, and series, two-circuit or wave windings. The series, two-circuit or wave winding is the kind that will generally be found employed on mine-locomotive armatures,

and this type is found in use on nearly all direct-current armatures intended for service in and around coal mining plants.

The characteristic shape of the coils for lap-wound armatures is shown in Fig. 5, while those for wave-wound armatures is shown in Fig. 6. The open-slot type of armature is used almost exclusively in direct-current armatures. The mold-wound coils, which can be used with open slots only, have many electrical and

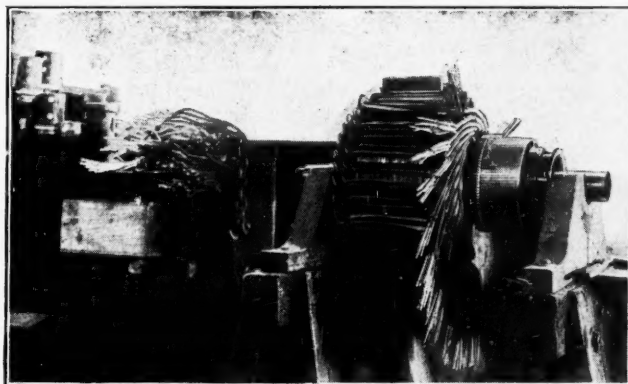


FIG. 2. ARMATURE SHOWN IN FIG. 1, PARTLY REWOUND

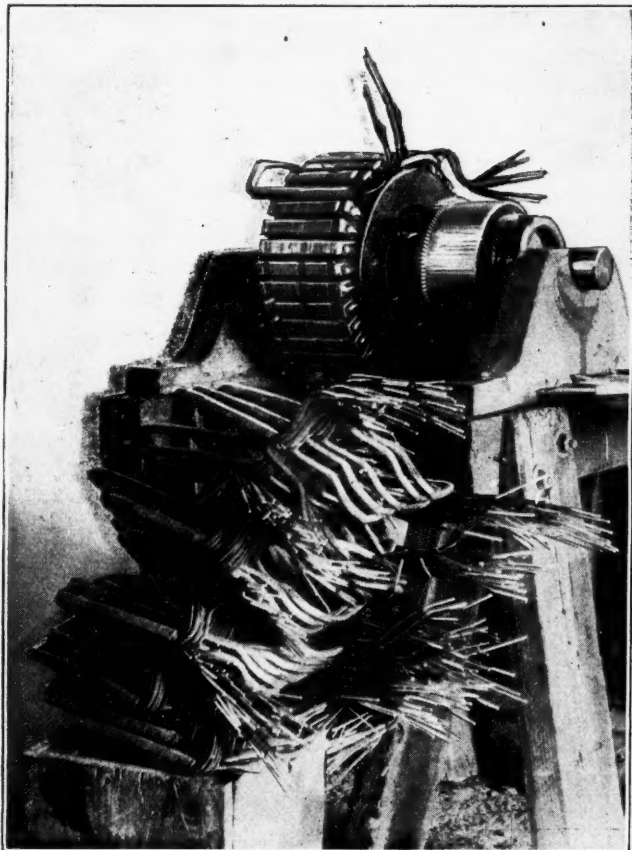


FIG. 1. LOCOMOTIVE ARMATURE READY FOR REWINDING

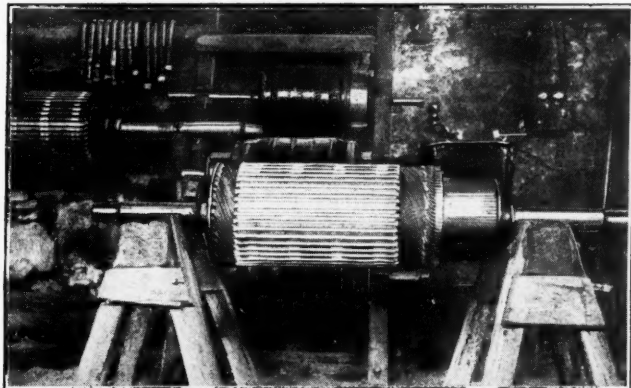


FIG. 3. OLD LOCOMOTIVE ARMATURE PARTLY REWOUND

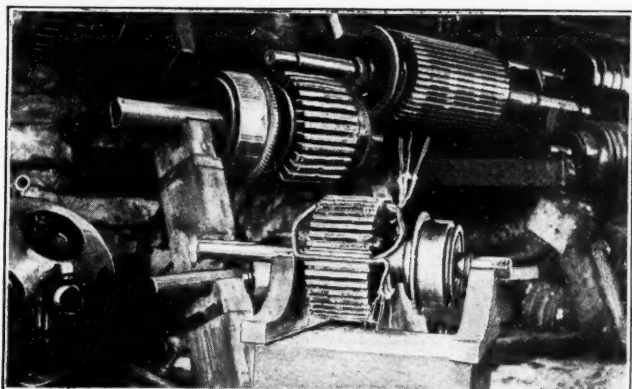
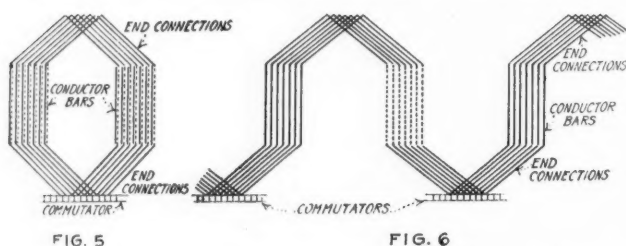


FIG. 4. PUMP AND LOCOMOTIVE ARMATURES

mechanical advantages over the other types, and the open slot has come into common use.

The form of coil generally employed is the diamond coil. This is frequently made in one of the shapes shown in Figs. 7, 8 and 9. In the one-piece series diamond coil, Fig. 7, the leads at the end of the straight parts are either strap- or wire-wound. Fig. 8 shows a



FIGS. 5 AND 6. CHARACTERISTIC SHAPE OF LAP AND WAVE-WOUND COILS

one-piece series diamond coil with leads at the ends of the straight parts. Fig. 9 shows a two-piece series diamond coil, Fig. 10 a one-piece multiple diamond coil with leads at the point of the diamond, and Fig. 11 a two-piece multiple diamond coil.

The diamond coils, when completely insulated before they are inserted in the armature, can be used in open slots only. Their great advantage is the easy and simple manner in which they can be manufactured, especially in large quantities, which makes them well adapted for standard machines.

Since all the coils used on the one type of machine are of the same size and shape, only one winding mold over which to form them is necessary. Moreover, the number of spare parts which must be kept on hand for repairs is reduced, and repairs can be made easily and in a minimum of time.

From the electrical point of view, the diamond type of winding possesses the advantage of being absolutely symmetrical. Hence there is no tendency for the unbalancing of voltages due to the differences of self-induction, and in closed windings there is no tendency to produce internal circulating currents. Pitch, or spread of coils, is illustrated in Fig. 12, which shows a single drum-wound coil in a multipolar field. The sides of the coil A and B should be separated by about the same angle C as the angle D between adjacent poles. The angle C is often referred to as the pitch or spread of the coils, or winding pitch. The angle D is called the angular pitch of the poles. The spread of the coils may differ a little from the angular pole pitch without affecting the action of the machine, but if the difference is large there is liable to be sparking at the brushes. The single-series winding is the principal type in use. In the series type of winding, sometimes called

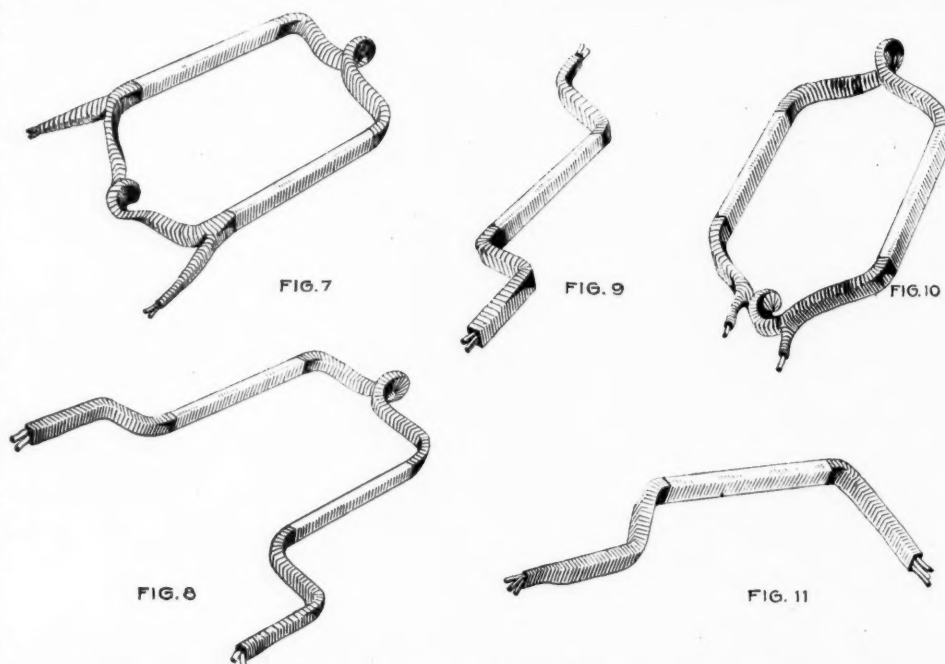
wave winding, the coils are connected to segments removed from one another by approximately the angle of two poles. On a single-series armature the number of coils and commutator bars must always be such that a series of $\frac{P}{2}$ coils connected to bars equidistant from each other will encircle the armature and terminate in a bar adjacent to the one from which the series started.

That is, $N = \frac{P}{2} \times Y \pm 1$, in which N is the number of commutator bars or coils, P is the number of poles and Y is a number called the pitch of the connections, or the connecting pitch, it being the number of bars passed over between the terminals of a coil.

In most cases the connecting pitch of an armature is + (plus) 1, commonly called "one over." The advantage of connecting one over is that sometimes in repairing an armature all of the leads are removed from the commutator and it happens that several are broken off close to the commutator. The leads can be reconnected — (minus) 1, or "one under." By this method the broken leads that would have been too short to connect to the commutator one over, will probably reach when connecting one under. The only difference that the change in reconnecting from the one over to the one under will make in any armature is the direction of rotation. That is, changing the armature connections from one over to one under, also changes the direction of rotation in that armature; but as this is a simple matter to adjust at the motor or controller, it will not make any difference.

On four-pole motors the pitch of the coils, or the winding pitch, is usually a little less than one-fourth the number of slots. The throw of the leads must be such that the brushes will rest on bars connected to face conductors in the neutral region.

In the rewinding of any armature the only practical and safe method is the following: The core is cleaned, all slots are filed out, and all sharp corners and edges are removed. The commutator is cleaned and all slots for the leads are cleaned out and tinned. The mica



FIGS. 7, 8, 9, 10 AND 11. SHOWING VARIOUS SHAPES OF ARMATURE COILS

rings on both back and front of the commutator are cleaned and given a coat of shellac varnish, after which a cord band is wound on them. This band is then given a couple of coats of shellac varnish. The commutator is given a thorough test for grounded and shorted bars, with a lamp and test terminals in series. After all the "bugs" are removed from the commutator, all parts of the core that need it should be insulated and painted.

Next find the proper pitch of the coils and the connecting pitch of the leads. For example, assume a four-pole machine, with 35 armature slots and 105 commutator bars, $N = \frac{P}{2} \times Y \pm 1$. In this instance $\frac{4 \times 105}{2} = 52\frac{1}{2}$, called in this case 53, $53 + 1 = 54$, which gives the connecting pitch of 1 and 54; that is, one lead of the coil connects to bar 1 and the other end of this coil connects to bar 54. The next coil leads connect into bar 54, then connect to bar 107, re-counting the bars 1 and 2, see Fig. 13. This is called

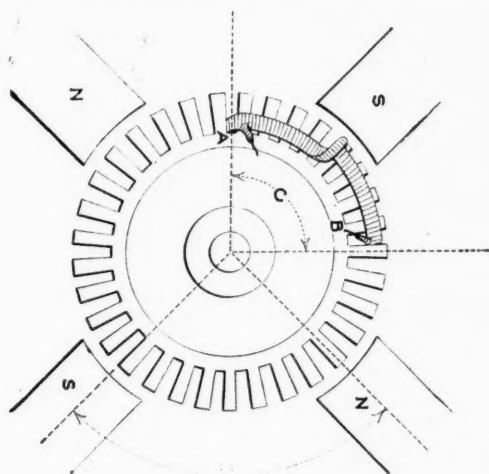


FIG. 12. ONE COIL IN A MULTIPOLAR FIELD

one over, or plus. The connections can also be made as shown in Fig. 14. This is called one under, or minus.

After determining upon the proper slot pitch of the coils and the connecting pitch proceed to put in all of the coils, using the proper amount of insulation in the slots and between the parts of the coils, etc., and keeping them shaped properly. As each coil is placed in the slots the bottom leads are connected to the commutator. The proper slot pitch for the armature in the example chosen—that is, with 35 armature slots—will be 9. This means that the top part of the coil will go into slot 1, while the bottom part will go into slot 9.

After all the coils are in place, and all of the bottom leads are in the commutator slots, tie a wire around the commutator so as to short-circuit, or connect all the commutator bars together, and then make a test for grounds. Remove this short-circuiting wire and cut off all surplus from the leads that are connected to the commutator; separate all of the top leads, and make a test for rotation as follows: Place one terminal of the lamp-test set on a commutator bar, marking this bar, then with the other test terminal touch the top leads until the proper coil is found—that is, until a coil lead is found that the lamp will light up on. Still leaving the test terminal on the same bar, touch the

leads on each side of the one where the lamp lights up. Getting no light from these leads indicates that the lead that the lamp lights up on is O. K.

If the lamp lights up on more than the one lead at a time, it indicates that the leads are either crossed or shorted together, or else the commutator bars are shorted together. Make this test all the way around

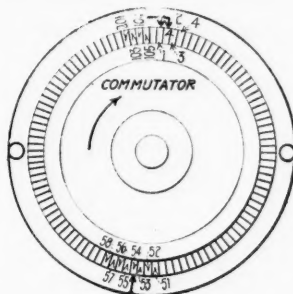


FIG. 13

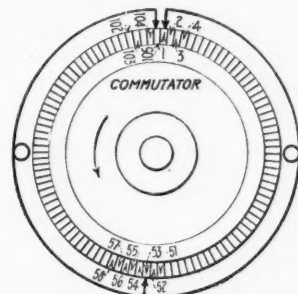


FIG. 14

FIGS. 13 AND 14. ONE OVER AND ONE UNDER WINDINGS

the commutator by moving the test terminal one commutator bar at a time, and then touching the top leads with the other test terminal until the lamp lights up. The top leads should test out in rotation. As the leads are tested separate them and lay them out in rotation as they are to go in the commutator.

Next insulate the bottom leads and find the proper connection for the top leads. Then proceed to put in the top leads all the way around the commutator. When all the leads are in place make another test for grounds. In making this second test for grounding it is not necessary to tie a wire around the commutator as the coils are all interconnected now. Finding the armature clear of grounds, make a test for circuit by touching the test terminals of the lamp test set, on the commutator. The lamp should light up no matter to what parts of the commutator the test terminals are touched. Finding everything all right, the next step is to solder all leads in the commutator and shape all coils to place, then give a coat of thin shellac varnish or other insulating paint. Next insulate and put the band wires on, taking care that the tension on the band wire is steady and fairly tight. The proper tension to use in

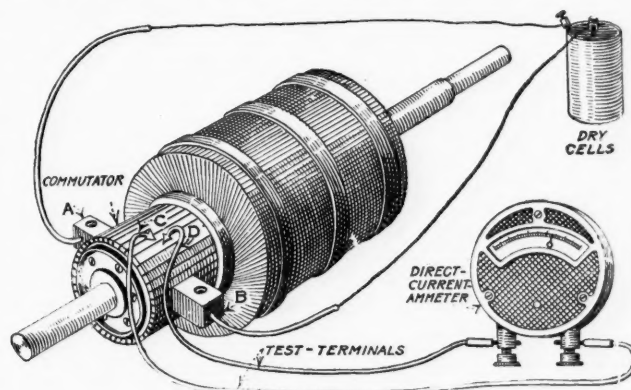


FIG. 15. HOMEMADE TEST SET IN OPERATION

banding an armature is a matter of judgment on the part of the winder, since this depends on the size of the armature and size and kind of band wire, also the speed and the service at which the motor is to be used. Solder the bands and give the clips a little extra solder;

then true up the commutator by putting the armature in a lathe and taking a cut or two off the commutator. Next proceed to make the following tests: Test for ground, then successively make a bar-to-bar test for open circuits, short circuits, poor connections and reversed leads.

A reliable and satisfactory test set that can be made at any mine and used in making the bar-to-bar test is shown in Fig. 15. It is constructed as follows: Take a common switchboard or portable ammeter, direct-current type, and leave out the shunt. Connect two test terminals as shown at *C* and *D*; connect about four dry cells in series to the points *A* and *B*. On the commutator of some armatures it is necessary to move these points closer together than is shown in the diagram, in order to get a reading on the ammeter. This can be found only by test. Take the two test terminals *C* and *D*, and touch adjacent commutator bars. If the

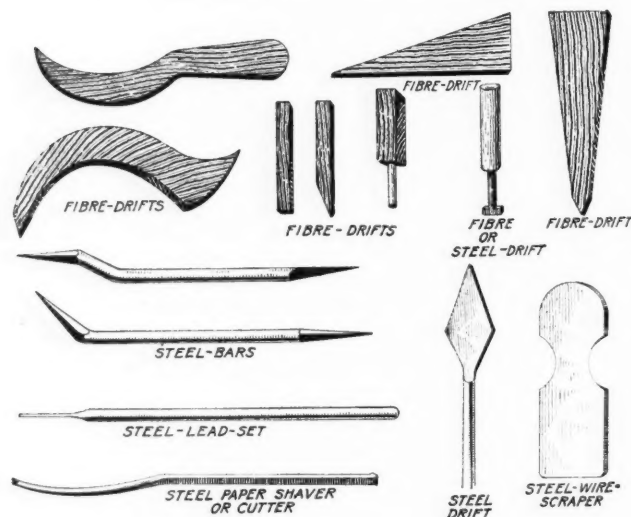


FIG. 16. A FEW ARMATURE REWINDING TOOLS

coils are all right the ammeter will read approximately the same on every two bars between *A* and *B*. After testing all bars between the points *A* and *B* move the points *A* and *B* around a little and test again until all of the commutator bars have been tested in this manner.

If a coil or a commutator bar is shorted the reading on the ammeter will be practically zero. If the coil is open-circuited there will be no reading on the ammeter until the open is bridged by the test terminals, when there will be a very high reading, throwing the ammeter needle violently across the dial. If the coil is reversed—that is, if the leads are crossed—the reading on the ammeter will be reversed. If the coil is poorly soldered or connected to the commutator bars the reading on the ammeter will be high. A little practice will enable anyone to make rapid and thorough tests with a test set like the one just described.

In the rewinding of any armature the success of the winder depends greatly upon the methods employed. In rewinding an armature it is advisable to be careful, neat and particular from the start to the finish. Never get in a rush and start to slap the coils or connections in any old way, as this does not pay. Do not strike a coil with a hammer; always use a piece of fiber between the coil and the hammer. A rawhide hammer

is useful in rewinding, as the blows from such a hammer will not damage the coils. In tapping the coils into place and into the slots always use a fiber drift of the proper size and shape. In Fig. 16 are shown a few of the common armature-rewinding drifts and tools.

All armatures after rewinding should be tested for balance. The armature is mounted on two exactly horizontal knife-edges. If it shows a tendency to rotate, it is out of balance. Weights are applied wherever needed to correct unbalancing.

Legal Department

FORFEITURE OF LEASES FOR NONPAYMENTS.—Before a court will decree forfeiture of a mining lease because of failure of the lessee to make stipulated payments, it must appear that the lessor, not only has an equitable right to forfeiture, but also that he cannot obtain adequate redress by means of suit to recover the payments due. (*Indiana Appellate Court, Rembarger vs. Losch*, 118 *Northeastern Reporter*, 831.)

NEGLIGENCE AS TO UNEXPLODED CHARGES.—If an unexploded charge of dynamite was negligently left in a mine entry wall, and the operator's foreman negligently permitted plaintiff, a miner, to work at the place, drilling a hole nearby, and injury resulted to plaintiff, the assignment of plaintiff to work at that point constituted actionable negligence, entitling him to recover. (*Oklahoma Supreme Court, Corrigan vs. Oklahoma Coal Co.*, 171 *Pacific Reporter*, 47.)

INJURY TO UNINVITED PERSONS.—The fact that defendant company gratuitously furnished one of its engines and flat cars, used exclusively in coal-mining operations, to convey the remains of two of its miners, who had been killed at work, and their friends and relatives to the cemetery where interment was made, did not render the company liable for accidental injury to plaintiff, who boarded the car without invitation and rode on the return trip and who fell to the ground while one of defendant's representatives was assisting the persons on the car to alight by means of a plank placed from the ground to the car; there being no proof of any wanton or positive negligence on the part of the company or its employees. (*Kentucky Court of Appeals, Laxton vs. Wisconsin Steel Co.*, 201 *Southwestern Reporter*, 15.)

WHEN AN OPERATOR MUST AFFIRMATIVELY DISPROVE NEGLIGENCE.—The general rule of law that when an employee sues to recover damages the burden rests on him to affirmatively establish negligence for which defendant employer was legally responsible is modified in Iowa by the drastic provision of the Workmen's Compensation Act: "In actions by an employee against an employer for personal injury sustained, arising out of and in the course of the employment, where the employer has selected to reject the provisions of this act, it shall be presumed that the injury to the employee was the direct result and growing out of the negligence of the employer; and that such negligence was the proximate cause of the injury; and in such cases the burden of proof shall rest upon the employer to rebut the presumption of negligence." Applying this provision in the case of *Mitchell vs. Phillips Mining Co.*, 165 *Northwestern Reporter*, 108, the Iowa Supreme Court holds that plaintiff having proved that a miner sustained fatal injury through a fall of slate from defendant's mine roof, while the miner was performing duties of his employment, and that defendant had rejected the provisions of the Workmen's Compensation Act, the proof was sufficient to sustain recovery against defendant, in the absence of affirmative proof by defendant of its freedom from negligence.

A Uniform Cost Sheet

SYNOPSIS—Each operator presumably has filled out Federal Trade Commission blanks, reporting on the monthly coal cost, income and coal tonnage for the current year. He is supposed to be familiar with the details of this task. Nevertheless, there has been some uncertainty as to just what is required in this report. The Winding Gulf Operators' Association considered it worth while to have a committee, made up of members from its organization, thoroughly investigate the whole matter. The report of the committee on the uniform cost sheet, with instructions as to its use, is most timely and the suggestions made should be of interest to operators generally. A full discussion of this matter might influence new rulings which are expected to be made for the year 1919.

"COAL is costing too much. I noticed by our cost sheet this morning that it was 11c. higher last month than the preceding month, and we will have to locate the items which caused this and do better." This statement was made by the general manager of a large coal company to his superintendents of mining and preparation. It suggests one successful method of management. When the total cost seems excessive, a careful analysis of all the items entering into the mining and preparation of coal would often enable a manager to put his finger on the trouble at once without going out of his office.

Another equally successful manager might get at the matter in an entirely different way. If the cost of placing coal on cars was too high, he would depend on locating the trouble out on the ground. It is difficult to find this manager in his office. He spends his time out around the breaker or tippie, down in the mines and at every point about his plant where men are at work, where supplies are being used, noting the efficiency or failure of methods. Both men emphasize the importance of attention to details. One man reads his cost sheet, the other depends more on personal observation.

QUESTION OF COSTS NOW RECEIVING ATTENTION

Today most of the large coal companies and the more progressive operations have more or less elaborate cost sheets in which all the items entering into expense and receipts accounts are carefully distributed. During the last year or so great attention has been given to costs all over the United States. This is due in many cases to the impetus given the matter by the Washington authorities. In this connection a report of a committee of the Winding Gulf Coal Operators' Association of West Virginia is most interesting. The members of this association are operating in the southern part of Raleigh County, West Virginia, on lines of the Virginian and the Chesapeake & Ohio railroads. The committee in question, after a thorough investigation reported on the uniform cost sheet of the Federal Trade Commission with instructions as to its use; a local interpretation is given to some features of the standard

cost sheet for the guidance of the association's members in filling out the required monthly report. However, the operators in the field in question are progressive and their opinions should be of interest to coal men not only in other sections but also in other states.

This report notes that the United States Fuel Administrator has stated officially that the question of the selling price of coal is one that is open to constant review; that cost engineers are continually examining the cost sheets in all the coal districts in the country. The Winding Gulf committee finds that one of the most important questions in the coal-mining business today is to see that the proper charges are made against the cost of coal. It is of special importance that each individual operator returns as fair and accurate a cost report as practicable, in view of possible future adjustment of the selling price of coal.

Note is made that the basis upon which the selling price is fixed is entirely upon cost. Since this report was published the Fuel Administration has ruled that a bonus of 20c. a ton may be added to the Government price in the case of operators who use special means for eliminating impurities. Later a further effort to insure the loading of clean coal was made in an order enforcing operators who failed to comply in this respect to either clean the coal or accept 50c. a ton less than the Government price. The committee earnestly recommended that a uniform system of coal cost accounting be seriously considered by each individual operator with a view of standardizing all accounts. It would greatly facilitate the work of the Federal Trade Commission and the Fuel Administration if all operators acted on this suggestion.

SCOPE OF THE STANDARD COST SHEET

The 1918 standard cost sheet seeks first of all to arrive at the total mining cost, which is divided into labor and supplies. Labor is subdivided as follows: (a) Mining; (b) yardage; (c) haulage; (d) tippie; (e) removing stripped coal; (f) power; (g) washery; (h) other operating labor; (i) maintenance and repairs—(1) structures, (2) equipment; (j) superintendence and engineering. In its report the Winding Gulf committee disregards the items (e) removing stripped coal and (g) washery, as these accounts do not enter into the costs of the Winding Gulf operations.

Each of the subdivisions has a further subdivision. Supplies are subdivided as follows: (a) Mine timbers; (b) feed and other stable supplies; (c) power house fuel; (d) power purchased; (e) water purchased; (f) washery supplies, including water; (g) other operating supplies; (h) maintenance and repairs—(1) structures, (2) equipment. The items (e) water purchased and (f) washery supplies are disregarded in the Winding Gulf report and an additional account, "explosives used," is specified. In connection with the item (b) feed and other stable supplies, note is made that operators should inventory their stable account at the end of each month and close the account for the month. The labor at the stable should be charged under the head of "haulage." The feed used should be charged to "feed and other stable supplies." A stable account should be opened at

the beginning of each month, charging it with the inventory of the previous month.

The Winding Gulf report states that the gross cost of labor and supplies is now complete. To obtain the total operating cost several other items should receive consideration. Among these items is the profit or loss on the powder house; to obtain this the inventory of the magazine should be taken at the end of each month. The magazine account should be opened on the first of each month, charging it with the stock on hand. The gross returns from smithing should go into this operating account as well as the gross returns from the power house and the substation. The net debit or credit balance for mine checks, unclaimed wages and any other accounts in the mining business should be considered, and the total debit or credit either added or deducted to obtain the total operating cost.

Under fixed charges and general expense are included (a) royalty, (b) depletion and (c) depreciation. Royalty is arrived at on leased lands according to the terms of the leases. As to depletion, the Winding Gulf committee states that some confusion exists as to the correct interpretation of the matter. The committee advises those who purchased property prior to Mar. 1, 1913, to deplete on the value en bloc as of Mar. 1, 1913. If purchased after that time deplete on the original cost, on the assumption that this position will be sustained by the courts.

In regard to depreciation the committee states that the question of depreciation on mining property is one about which no two people hold the same view. This is a most interesting and important matter; after diligent research and much investigation the following was recommended by the committee: All structures which are directly engaged in the mining of coal should be listed at their original cost under this head; all equipment used directly in the mining of coal should be listed at original cost and be placed under this head; all development of mines in question, including the sinking of shafts and slopes, the driving of tunnels through faults over 50 ft. in length (other development work of like character should be included) should be listed and be placed under the head of development. These three items together with a fourth—(d) miscellaneous income—are all taken into account in the cost of coal. Under this last item are included outside investments not included in the first three classes.

After the structures account has been opened up the following depreciation is recommended:

	Per Cent.		Per Cent.
Wooden tipples, complete..	8	Churches and schools.....	4
Steel tipples, complete....	5	Squire's office and jail....	4
Wooden power house (building)	7	Sand houses	4
Stone or brick power house	5	Postoffice building	4
Machine shop—wood.....	8	Substation—wood	7
Machine shop—stone or brick	5	Substation—stone or brick.	5
Supply house—wood.....	8	Humidifier building—wood.	7
Supply house—stone or brick	5	Humidifier building—stone or brick	5
Blacksmith shop—wood....	8	Powder house—concrete, stone or brick.....	10
Blacksmith shop—stone or brick	5	Wash house—wood	10
Stable building—wood.....	8	Wash house—stone or brick	5
Stable building—stone or brick	5	Fireproof vaults	4
		Freight stations	10
		All other small buildings...	10

After the mine development account is opened up, depreciate as follows:

	Per Cent.		Per Cent.
Clearing property	5	Diamond drill holes.....	5
Creek changes	5	Tram roads	20
Wagon roads	5	Mine development	10
Slopes and shafts.....	5		

After the equipment account is opened up depreciate as follows:

	Per Cent.		Per Cent.
Dynamos and engines.....	8	Mine wagons (cars)—steel.	17
Boilers	11	Mine locomotives	10
Pumps, heaters and other power house equipment..	8	Mining machinery	20
Header lines	8	Electric drills	25
Fans	5	Stable equipment	25
Water tanks	7	Patent mine doors	20
Railway sidings and approaches	7	Copper wire	7
Humidifiers	12½	Supply house fixtures....	10
Telephone lines	10	Post office equipment and fixtures	7
Saw mills	10	Fire equipment	20
Hoists	7	Air compressors	8
Incline drums and larries..	10	Good roads machinery ..	10
Incline ropes	33½	Shop fixtures and machinery	7
Cage ropes	50	Stationary motors	7
Hoist engines	7	Watchmen's clocks	10
Mine telephones	20	Pipe lines in mines	33½
Mine pumps	20	Barber shop fixtures and barber shop	10
Steel rail	10		
Mine wagons (cars)—wood	20		

In connection with the miscellaneous building and fixtures account, depreciate as follows:

	Per Cent.		Per Cent.
Theater building	6	Store and office buildings—stone or brick.....	5
Theater building fixtures and poolroom	20	Furniture and fixtures in same	10
Store and office buildings—wood	6	Tenement houses	6
		Club house furniture	15

It is assumed in charging up the various depreciation items against coal that the revenue derived from this source will constitute a working capital and not be distributed as dividends. It is further assumed that the depreciation percentages given are for one year and that this fact is taken into account in making out monthly reports.

Before arriving at the total mining cost of coal, there are a number of other charges which should receive consideration. Among these are deferred charges, including unrecoverable royalty, which will have to be figured out in individual cases. Further, the executive committee of the National Coal Association advises that an account be opened up under the head of special maintenance, to which should be charged coal at the rate of 5c. per ton to take care of the abnormal cost in the present mine equipment. In other words, to charge to this account those parts of the cost of material and equipment which are above normal prices and which are used in capital accounts only. Then gradually work off, through this 5c. per ton per month, the abnormal cost of material and supplies going into capital accounts.

The Winding Gulf committee also would open up a contingent account to take care of explosives and other damages beyond human control. After due investigation and advice the committee feels that special maintenance and contingent accounts should be included, notwithstanding the fact that they have not been allowed by the Federal Trade Commission.

It is advised that all state excise and corporation taxes, county taxes, United States Government stock taxes, and, in fact, all taxes except United States income and excess profit taxes should be charged and prorated to the different departments to which they belong. The suggestion is made that the previous year's taxes along these lines be taken and then apportioned one-twelfth of that amount each month and charge it up to the proper departments. Set this amount off as a reserve for these taxes and the last month in the year reconcile this account with the amount actually paid.

Similarly with insurance. The premiums on all fire insurance that properly belong to the mining property directly engaged in the mining of coal should be charged

to the cost of coal. Thus the insurance on the store building and stocks should be charged against the rent account; fire insurance on other subsidiary lines of business, not directly engaged in the mining of coal, should be charged to the proper account. It is further advised that the entire amount of premium paid for explosion and use and occupancy insurance be charged against coal under the head of general insurance. It is suggested that the total cost of all this be figured out from the policies for one year and then one-twelfth of the total amount be charged each month.

All officers' salaries and office expenses, with some possible exceptions (in West Virginia—the scrip clerk), should be charged against coal. If there is a shipping clerk or clerks of any kind who spend their time at the mines, their time should be included in the two items, officers' salaries and office expenses. All legal expenses except those expenses incurred for personal injury accounts or legal expenses incurred in acquiring new property should be charged against coal under the item legal expenses. The total operating cost and the total fixed charges and general expenses are now available; adding these costs, charges and expenses together gives the total mining cost of coal.

The committee now turns to coal tonnage. This should include the tonnage furnished employees, or sold at the mines, power house, and shipments—rail or otherwise. This tonnage is to be taken from the returns from sales agents for the coal shipped and the accounting of the company's force at the mine for coal used and coal delivered at the tippie. Following the tonnage, as to quantity, is a space for recording the cash returns for coal sales. This account is made up from the returns from sales agents together with the accounts kept at the mines for coal used and coal furnished.

Under coal inventories are spaces for an inventory at the first of the month, at the end of the month, and increase or decrease, as the case may be. Under production tonnage are included total sales derived from detailed tonnage accounts. If coal has been purchased it should be deducted from total sales. The inventory should be added in event of increase or deducted in case of decrease. The final result is the production tonnage for the month and represents the coal dumped over the tippie. It is the divisor to be used to divide the total mining cost previously obtained.

As to selling cost—this includes (a) commissions, (b) advertising, (c) salesmen's salaries and expenses, (d) officers' salaries and expenses, (e) clerical salaries and office expenses, (f) uncollectible accounts and (g) miscellaneous. There are two columns under selling cost—amount for the current month and the amount Jan. 1 to and including the current month. The committee did not instruct definitely under this head, as many of the operators have contracts with selling agents who remit net at the mines so much per ton. To such operators this fact should be thus stated on the return. Many operators sell their own coal, have pooled their interests with others, or have special arrangements with selling agents. Those operators who make a return on selling cost should include the tonnage returns by the sales agents and the coal sold at the tippie. Coal used in a power house should not be considered, as it carries no cost for selling.

Under income statement, the Federal Trade Com-

mission endeavors to arrive at the real money a company has received. Little comment seems to be necessary up to the point where the profit from coal is noted. Under miscellaneous income the Winding Gulf committee states that the operators should show the profit or loss each month from their dwellings. Dwellings should be credited for rent collected and charged with ordinary repairs, with their proportion of the insurance, taxes and depreciation. Also the stores and any other part of an operator's business indirectly engaged in the mining of coal should be so handled. As the Winding Gulf fields at this time have no private transportation lines or coke ovens, these features are not touched upon. However, net receipts from any other profits, as well as proper depreciation charges, should be included in miscellaneous income. Under deductions from income are noted (a) taxes (income and excess profits) and (b) interest. The committee considers that these items are more or less in the nature of an estimate; a reserve should be set aside each month on a company's books. When the annual income and excess profit tax is paid, the amount should be charged to the tax account and the cash account be credited. Similarly with the interest.

In connection with charges to fixed assets, the committee reports that if a company has spent any money on its property in the way of betterments that these amounts should be included.

Under general information the comment is made that the Federal Trade Commission has advised that the word "semi-bituminous" be used in answer to the kind of coal. Further, that for the field in question that "New River" be used in the column marked field; and that "Beckley" be used for number or name of seam—or "Sewell" or "Pocahontas," as the case may be.

The Winding Gulf committee concludes with the statement that it "has labored patiently with reference to this whole question and respectfully submits this report with the understanding that, in its opinion, it is the best advice and information that can be furnished at present on this matter. The whole question of coal cost accounting, as laid down by the Federal Trade Commission, as outlined in the foregoing, is good only for the year 1918. No doubt as we progress further along in this matter, new ideas and rulings will be made for the year 1919."

The report is submitted to E. E. White, president of the Winding Gulf Operators' Association, and is signed by E. B. Wray, D. C. Wade, F. K. Bowles, C. R. Stahl, R. F. Roth and George Wolfe, chairman. W. G. Caperton is the treasurer and J. H. Hatcher secretary of this association.

The conversion of the volatile matter of bituminous coal into liquid fuel seems to be even more promising than its conversion into gas. By the application of proper processes it seems possible to reduce a large part of the volatile matter of liquid, of which an appreciable percentage can be obtained in the form of light oils suitable for motor fuel. Benzol has been obtained at byproduct plants for many years without any special effort to produce it. There is no doubt that with well-developed methods the yield of benzol and similar oils could be greatly increased.—*Bureau of Mines Bulletin No. 135.*

Determination of the Proper Size of Storage-Battery Locomotive

By DEVER C. ASHMEAD

Tarrytown, N. Y.

SYNOPSIS—Two important considerations govern the selection of a storage-battery locomotive—drawbar pull and battery capacity. The maximum drawbar pull is easily determined. The battery capacity depends upon the amount of actual work to be performed between chargings and necessarily involves considerable calculation of loads, grades, speeds, etc. These calculations are here explained.

ALTHOUGH storage-battery locomotives have been used in a few mines for as long as eight or nine years, only within the last two or three years have they come into general use. Many operators do not yet understand them sufficiently to be able to decide on the proper size, and therefore have to rely entirely on the advice of the salesman who is selling these machines.

This is satisfactory in most cases, since the salesman is usually well versed in his own business. He is likely to make mistakes, however, which may be costly. A few instances have occurred (when competition has been severe) where a salesman has cut down the size of the battery in order to reduce the price so that he might get the order. Fortunately this rarely happens, as it is unusual for a salesman to sacrifice quality in order to make a sale.

The prospective purchaser of a locomotive should at all times be in a position to check the statements of a salesman or manufacturer and satisfy himself that the locomotive in question will do the work required of it. This knowledge I have endeavored to embody in this article, which is based on an experience gained in the installation and observation of more than 50 storage-battery locomotives.

PROPER SIZE IS IMPORTANT

After the operator has decided on the use of storage-battery locomotives, and has come to the conclusion that they can be used successfully in his mine, the next thing to determine is the proper size necessary to do the work. A locomotive that is not large enough will not do the required work, while one that is too large means a waste of power and money.

The first fact to know about a locomotive is the relation of its weight to its drawbar pull. This varies in the different types of locomotives; in other words, all locomotives will not have the same maximum drawbar pull for the same weight, but all such machines of the same weight, type and construction will have the same drawbar pull. At the present time there are seven different types of locomotives on the market. Table I enumerates the various varieties, with the relation between the drawbar pull and weight of the machine ex-

pressed in percentage of the weight of the locomotive. This relation is shown for both starting and running and is based on dry, clean sanded rails.

TABLE I. RELATION OF DRAWBAR PULL TO WEIGHT OF LOCOMOTIVE

Type	Total No. of Wheels	No. of Motors	No. of Driving Wheels	No. of Trucks	No. of Drivers on Each Truck	Type of Wheel	Percentage of Drawbar Pull to Weight	
							Running	Starting
1.....	4	1	4	1	4	C.C.I.	20	25
2.....	4	2	4	1	4	C.C.I.	20	25
3.....	4	2	4	1	4	S.	25	33½
4.....	8	2	4	2	2	C.C.I.	17½	20
5.....	8	2	4	2	2	S.	20	25
6.....	8	2	8	2	4	C.C.I.	25	30
7.....	8	2	8	2	4	S.	30	35

C.C.I. = Chilled cast iron. S = Steel.

Knowing the different types of locomotives, and the one that is preferred, it is easy to determine the percentage of the drawbar pull to the weight of the locomotive from Table I.

In order to ascertain the proper size of driving motor it is necessary to know the grades on which the locomotive will operate and what load it will have to handle over them. The grades can be determined from track levels, or if the locomotive is to be used in a part of the mine in which there has been no work done, it may be advisable to take part of the mine where the conditions are about what are expected and assume that these grades will be actually encountered.

The maximum load is easily determined. This depends on how many cars will be handled per trip on a heading and what each holds.

FRICTION MAY VARY CONSIDERABLY

The next point to consider is the amount of friction that the locomotive will have to overcome in order to move the train. This friction may vary from 10 to 40 lb. per ton of train weight. The friction depends entirely on the track conditions and the type and condition of the rolling stock. If the rail is heavy, the track well ballasted and in good alignment, the curves elevated and not too sharp, and the cars have well oiled roller bearings, the friction may be as low as 20 lb. per ton or even less for the train, and the locomotive may have a friction as low as 10 lb. per ton. If the rail is light, track poorly ballasted and crooked, curves flat and sharp and the cars have plain bearings, the friction may be as high as 40 lb. per ton of train weight. The prospective purchaser of a storage-battery locomotive must determine what condition his track is in and about what friction the locomotive will have to overcome. This friction can only be estimated.

The maximum load in tons that locomotives of various sizes can handle on various grades with different amounts of friction is shown in Table II. Knowing the maximum load that will have to be handled over the worst grade, and having estimated the amount of rolling friction per ton, the proper size of locomotive can be determined readily. The table is self-explanatory.

Having fixed on the size of the locomotive, the next step, which is probably the most important, is to determine the size of the battery to supply sufficient power to do the required work. Fig. 1 gives the drawbar pull necessary to move any load up to 220,000 lb. up any grade not exceeding 12 per cent., and with different amounts of rolling friction. Knowing the different grades that the locomotive will operate on and the load that it will have to handle up these grades, the drawbar pull necessary to move this load can be obtained for each and every grade.

Fig. 2 gives the watt-hours that will have to be drawn from the battery in order to furnish sufficient power to produce any necessary drawbar pull up to 7000 lb., and for any distance up to 5000 feet.

Therefore, knowing the drawbar pull from Fig. 1, and the length of the grade that this pull will be used on, from Fig. 2, the watt-hour consumption can be found. It will be noticed that there is no allowance made for negative grades or those in favor of the load,

as with few exceptions there will be practically no drawbar pull required here. When a small drawbar pull is necessary the minus grade can be assumed to be level and the drawbar pull assumed as that for level track.

The next quantity to be determined is the time that the motor will require to make a round trip. It is necessary to have this information in order to determine the number of trips per day, so that the number of times the locomotive passes over a certain grade will be known.

Knowing the times the locomotive will pass over the various grades, the next step is to multiply the watt-hours for each grade by the number of times the locomotive traverses it. The total will represent the number of watt-hours that the battery will have to produce in order to do the work required.

Having determined the watt-hour capacity of the battery, the next step is to decide on the type of accumulator and the size of the individual cell. In this, much will depend on the preferences of the individual oper-

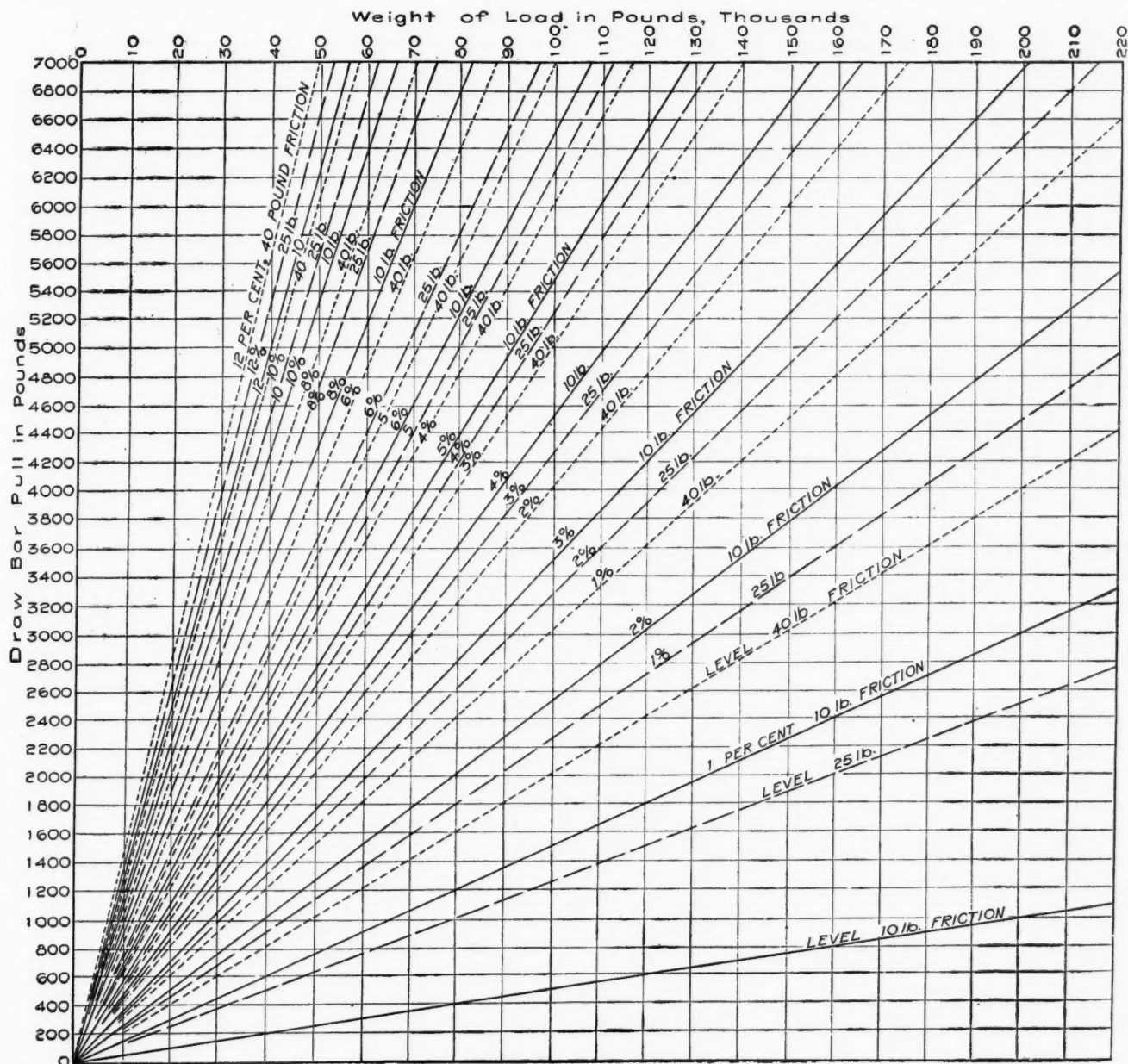


FIG. 1. DRAWBAR PULL FOR VARIOUS LOADS, GRADES AND COEFFICIENTS OF FRICTION

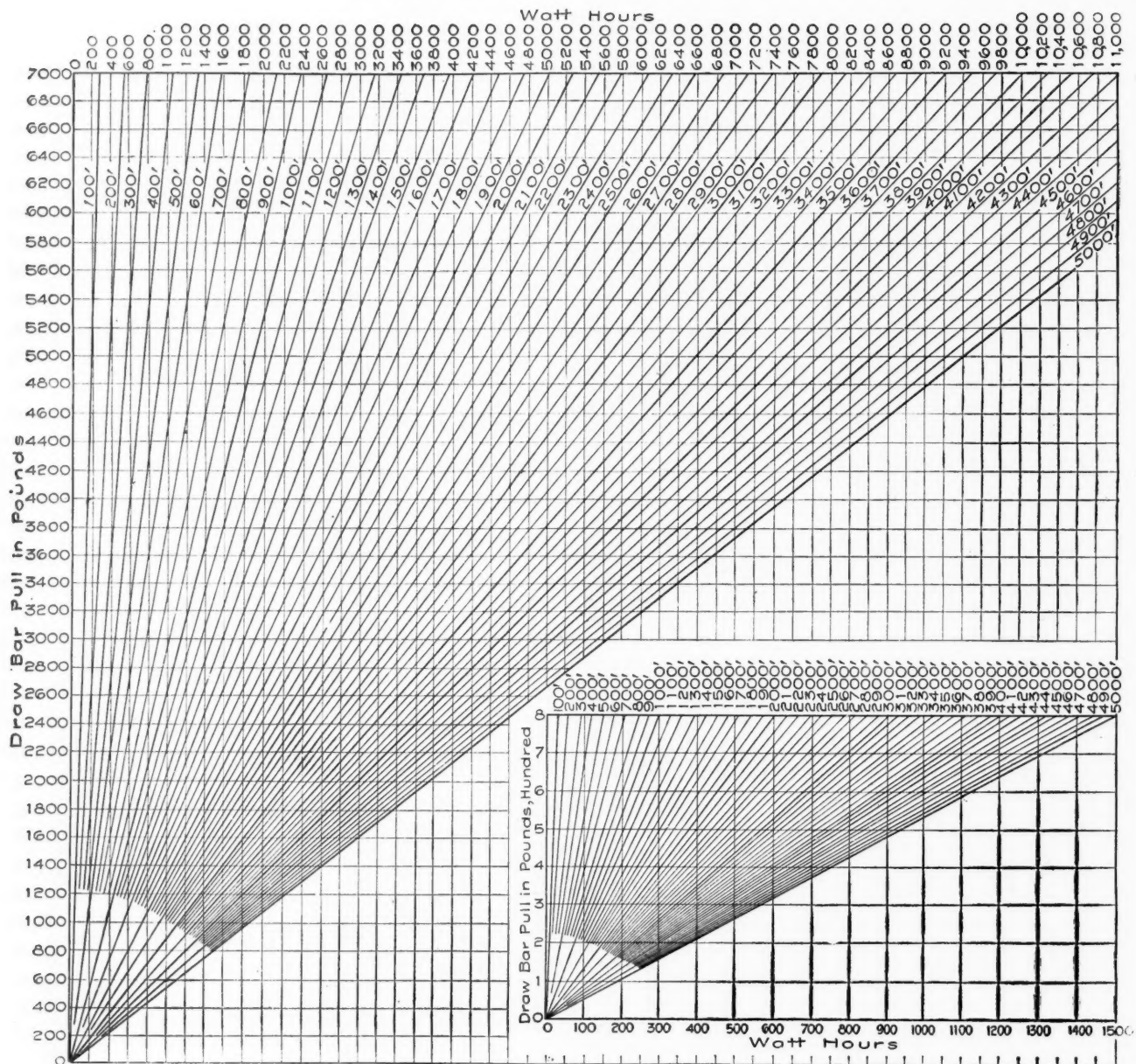


FIG. 2. THE WATT-HOUR CONSUMPTION FOR DRAWBAR PULLS AND DISTANCES

ator and on the information given him by the manufacturer. After the type of the cell has been determined, the only step necessary to settle the number of cells is to divide the total watt-hour capacity by the amperage of one cell and this quotient by the voltage of one cell. The result will be the number of cells required.

It will be noticed that no allowance has been made for any loss of power in the motor itself. The motors used in storage-battery locomotives of course are not 100 per cent. efficient, and there is also a loss between the battery and the motor and some loss within the battery itself. It is not necessary to consider these losses for two reasons. In the first place in the charging of the battery the ammeter is so arranged that a 20 per cent. overcharge is put into the battery, thus taking care of the battery loss. Secondly, the manufacturers always understate their batteries about 25 per cent. Thus if the manufacturer's rating is used when calculating the size of the battery, this 25 per cent. will compensate any further losses. The friction losses in the loco-

motive are taken care of in the calculation for the drawbar pull.

The following is a calculation of the size of a locomotive and its battery, to operate over certain grades and do a certain amount of work. Let it be assumed that the locomotive will be used for gathering, and that the total distance from the sidetrack to the last room is 2500 ft. The mine cars weigh empty 2000 lb. and hold a load of 3 tons.

The track from stations 0 to 100 on the cross-entry is level, from stations 100 to 400 it has a 2 per cent. grade against the loads; from stations 400 to 600 it has a grade of $1\frac{1}{2}$ per cent. in favor of the loads; from stations 600 to 1000 it has a grade of $2\frac{1}{2}$ per cent. against the loads. On the butt entry from stations 0 to 300 the track has a grade of 4 per cent. in favor of the loads; from stations 300 to 500 it has a grade of 2 per cent. against the loads; from stations 500 to 700 the grade is 5 per cent. in favor of the loads; from stations 700 to 1050 the grade is 6 per cent. against the loads, and

TABLE II. MAXIMUM LOAD IN TONS LOCOMOTIVES CAN HANDLE ON VARIOUS GRADES

Weight of Locomotive	Per Cent. Drawbar Pull to Weight of Locomotive	Level Rolling Friction in 1 Ton			1 Per Cent. Rolling Friction in 1 Ton			2 Per Cent. Rolling Friction in 1 Ton			3 Per Cent. Rolling Friction in 1 Ton		
		10	25	40	10	25	40	10	25	40	10	25	40
		17½	20	25	30	33½	35	17½	20	25	30	33½	35
4	17½	136	54	34	43	28	21	24	18	15	16	13	11
	20	156	63	39	49	33	28	28	22	18	19	16	13
	25	196	78	49	63	42	31	36	28	23	25	20	17
	30	236	94	59	76	51	38	44	34	27	30	25	21
	33½	263	105	66	86	57	43	50	38	31	35	28	24
6	17½	204	82	51	64	43	32	36	28	23	24	20	17
	20	234	94	59	74	49	37	42	32	26	28	23	20
	25	294	118	74	94	63	47	54	42	34	39	31	26
	30	354	142	88	114	76	57	76	51	41	45	37	32
	33½	394	158	99	127	85	64	88	57	46	52	42	36
8	17½	272	109	68	85	57	43	48	37	30	32	26	22
	20	312	125	78	99	66	49	56	43	35	38	30	26
	25	392	157	98	125	83	62	72	55	45	49	40	34
	30	472	189	118	152	100	76	88	68	55	62	50	42
	33½	525	209	131	172	112	85	90	75	62	68	56	48
10	17½	340	126	85	106	71	53	60	46	38	40	33	28
	20	390	156	98	123	82	61	70	54	44	47	39	33
	25	490	196	122	157	105	78	90	69	56	61	51	43
	30	590	236	148	190	127	95	110	85	69	76	62	53
	33½	660	264	165	213	142	106	124	95	78	86	71	60
12	17½	408	162	96	118	78	58	66	50	40	42	35	30
	20	468	192	112	136	92	68	78	60	48	51	42	36
	25	588	240	144	171	116	86	96	76	60	65	54	46
	30	708	288	176	204	140	104	114	90	72	78	64	54
	33½	792	324	200	230	158	118	132	102	84	90	74	63

in favor of the loads. Twenty-four men are working in a butt entry, 12 on each side, and each two men have three rooms.

The first step to determine is how long it will take the locomotive to make a round trip and how many trips it can make in a day of 9 hours under the maximum haulage conditions, which are encountered when rooms at the head of the entry are driven up 150 ft. and when the first rooms that the men are working in are practically finished. Therefore the average length of the rooms that the locomotive will have to traverse is about 225 ft. As 12 men will be working in pairs on each side of the butt entry, the locomotive will take six

TABLE III. CALCULATION OF TIME REQUIRED TO MAKE ROUND TRIP

	Minutes	Seconds
Couple motor to trip of 6 empties	1	30
Running time, sta. 0 to 100 at 4 miles per hour	17	17
Running time, sta. 100 to 400 at 8 miles per hour	26	26
Running time, sta. 400 to 600 at 8 miles per hour	17	17
Running time, sta. 600 to 1,000 at 8 miles per hour	34	34
Throw heading switch	5	5
Running time, sta. 0 to 300 at 6 miles per hour	35	35
Running time, sta. 300 to 500 at 8 miles per hour	17	17
Running time, sta. 500 to 735 at 8 miles per hour	20	20
Running time, sta. 735 to 870 at 4 miles per hour	22	22
Running time, sta. 870 to 1,470 at 5 miles per hour	1	16
Running time, sta. 1,470 to 800 at 4 miles per hour	2	20
Running time, sta. 800 to 500 at 8 miles per hour	26	26
Running time, sta. 500 to 300 at 7 miles per hour	20	20
Running time, sta. 300 to 0 at 8 miles per hour	26	26
Throwing heading switch	5	5
Running time, sta. 1,000 to 600 at 6 miles per hour	47	47
Running time, sta. 600 to 400 at 8 miles per hour	17	17
Running time, sta. 400 to 0 at 6 miles per hour	47	47
Running Time in Rooms:		
Uncoupling car	5	sec.
Throwing room switch	5	sec.
Run to face of room, 225 ft., 4 miles per hour	40	sec.
Uncouple car	5	sec.
Run back to switch, 225 ft., 5 miles per hour	31	sec.
Throw switch	5	sec.
Couple to trip	10	sec.
Total time in room	101	x 12 20 12
Total running time		31 min. 39 sec.

cars to a trip. Table III shows how to calculate the time required by the locomotive to make the round trip.

The track condition will be considered to be medium and the rolling friction to be 30 lb. per ton of train weight. It will be noticed that on a part of the 6 per cent. grade the heaviest load will be hauled—that is, six loaded cars weighing 48,000 lb. It will be assumed that the purchaser will prefer a locomotive of the two-motor, double-truck type with the drive on all four wheels of each truck, and that it will have steel wheels. By referring to Table I it will be found that this type of machine has a ratio of 30 per cent. between the drawbar pull and the weight.

Referring to Table II, under the column for a 6 per cent. grade and 30 lb. of friction per ton, the nearest figure to the maximum of 24-ton load is found to show an 8-ton locomotive with a tractive effort equal to 30 per cent. of its weight. Such a locomotive, therefore, will handle the load over the given grade and is of the proper type.

Having determined the weight of locomotive necessary, the next step is to find the size of the battery required to furnish the power. First the amount of power required on each grade will have to be determined. In order to learn this the drawbar pull on each grade has to be found. Then knowing the length of the grade, the watt-hour consumption can be obtained from Fig. 2. The best way is to tabulate the figures obtained as shown in Table IV.

The total number of watts required to make a round trip is thus equal to the sum of the watt-hours thus shown, or 1929.

between stations 1050 and 1500 the grade is 4 per cent. against the loads.

The rooms are 300 ft. long and are driven 1 per cent.

TABLE IV. METHOD OF TABULATING DATA

Station	Distance Ft.	Load, Lb.	Grade, Per Cent.	Drawbar Pull, Lb.	Watt-hours
1470-1335	135	L 16,000 T 8,000	4	720 440	1,160 58
1335-2200	135	L 16,000 T 16,000	4	720 880	1,600 80
1200-1065	135	L 16,000 T 24,000	4	720 1,320	2,040 100
1065-1050	15	L 16,000 T 32,000	4	720 1,760	2,480 14
1050-930	120	L 16,000 T 32,000	6	1,040 2,240	3,280 148
9930-795	135	L 16,000 T 40,000	6	1,040 3,000	4,040 210
795-700	95	L 16,000 T 48,000	6	1,040 3,600	4,640 170
700-500	200	L 16,000 T 48,000	5		
500-300	200	L 16,000 T 48,000	2	400 1,680	2,080 158
300-000	300	L 16,000 T 48,000	4		
1000-600	400	L 16,000 T 48,000	2½	480 2,000	2,480 376
600-400	200	L 16,000 T 48,000	1½		
430-100	300	L 16,000 T 48,000	2	400 1,680	2,080 237
100-000	100	L 16,000 T 48,000	Level	80 726	800 30
000-100	100	L 16,000 T 12,000	Level	80 180	260 11
100-400	300	L 16,000 T 12,000			
400-600	200	L 16,000 T 12,000	1½	320 420	740 53
600-1000	40	L 16,000 T 12,000	2½		
000-300	300	L 16,000 T 12,000	4	720 660	1,380 156
300-500	200	L 16,000 T 48,000	2		
500-700	200	L 16,000 T 17,000	5	880 780	1,660 128

The remainder of the grades for the empty cars are in their favor.

As the motor has to go in the rooms 12 times to make up a trip and distribute the empties, we get:

Distance, Ft.	Grade, Per Cent	Load, Lb.	Drawbar Pull, Lb.	Watt-hours
225	I	L 16,000 T 2,000	240 50	290 23
225	Level	L 16,000 T 8,000	80 120	220 19

Equals 504 total watt-hours

42×12

This gives a grand total of 2433 watt-hours for a complete round trip, and as the locomotive will make 17 round trips in 9 hr., the battery will have to furnish 41,361 watt-hours. It may be safely assumed that the cells will be of 500 ampere-hour and the voltage of the battery will be 82. Allowing 2.2 volts per cell, the total number of cells required will be 38. As this number is not convenient for the locomotive manufacturers, they will probably use either 42 or 44 cells. This number will obviously give a capacity and voltage slightly above bare requirements, which is not objectionable.

Minecdotes

On Center and Backfired

The new motorman was expressing his opinion of his locomotive. He said it reminded him of both a steam engine and a flivver.

"How do you figure that out?" asked "Curly," our oldest motorman.

"Well," said the new man, "the darn thing got on center this morning, and when I went to push it off it backfired and knocked me down. Now, then, if that is not like a steam engine and a flivver, what is?"

"On center and backfired? What you trying to give us?"

"I'm not trying to give you anything. I mean just what I said. It happened over at the South, where

those boards are alongside the rails. I was coming out of there real slow, with no cars on, and the fire was flashing something fierce from the wheels and the rails. The locomotive acted just like the spark was missing in some of the cylinders. We were coming along in jerks, and then it stopped dead. I tried to start it several times, but nothing doing. I concluded the darn thing was on center. I put the controller lever on the first point, got off, and started to shove on the thing so as to move it off center. The blame thing must have backfired, for it knocked me a winding. It sure hit me a good one, and I saw all kinds of fireworks. It certainly hit me some wallop."

"Oh, so that is what you call on center," said the others after they had had a good laugh. "Why Simple Simon had nothing on you. What your trouble was, was that the locomotive wheels had so much dirt and sand between them and the rails that they were practically insulated from the return. When you put the controller on the first point you simply charged the whole works, the same as the trolley line. Then you got off to push on the machine and probably put your foot against the rail and your hands on the locomotive. Sure thing you saw fireworks and thought a mule had kicked you! Better be more careful next time, as you are liable to get on center and the backfire will knock you out for keeps. We have all had the same experience at one time or another, and experience is a wonderful teacher. Even if it is at times a little rough on a fellow, it generally leaves an impression that is not soon forgotten."



More Profitable for Whom?

Steel Cantilevers Support Headframe

SUPPORTING the headframe over a mine shaft by cantilever trusses was the expedient resorted to at the "A" shaft of the Pioneer mine of the Oliver Iron Mining Co. at Ely, Minn., because of unstable ground.

This shaft was sunk in the early '90s, and was then equipped with a timber-frame shafthouse. It had been impossible to explore the ground in advance to such an extent as to determine thoroughly the nature of the underlying rock, but no change of alignment was experienced until 1900, when a slip in the formation was noticed about 135 ft. below the collar of the shaft. The depth at that time was 1110 ft. The alignment was maintained without difficulty, however, by trimming the timbers and occasionally replacing a shaft set.

A steel headframe was built in 1909, up to which time the settlement at the surface had not been serious. In this structure the rear columns were placed 70 ft. from the shaft and were supported on independent concrete piers founded in good solid ground. The front columns and ore-pocket columns were supported on a concrete base, 50 x 65 ft. and 3 ft. thick, reinforced at top and bottom with steel rods, so that when settlement occurred the entire front portion would move uniformly, thus causing no undue stress in the steel members.

The bases of the rear columns were provided with a hinged joint. The bases of the front columns and ore-pocket columns were fitted with brackets so that jackscrews could be placed under these to raise the columns and thus take up any settlement of the ground. From 1909 to 1912 the settlement due to the slip in the shaft amounted to 9 in., which was taken up by jacking the front columns of the shaft at different times and putting blocking under the bases.

Movement of the ground became much more serious in 1912, and it was apparently unsafe to continue mining operations near the shaft without making provision to support the shafthouse. Consideration was given to three different methods for supporting the shafthouse and pockets.

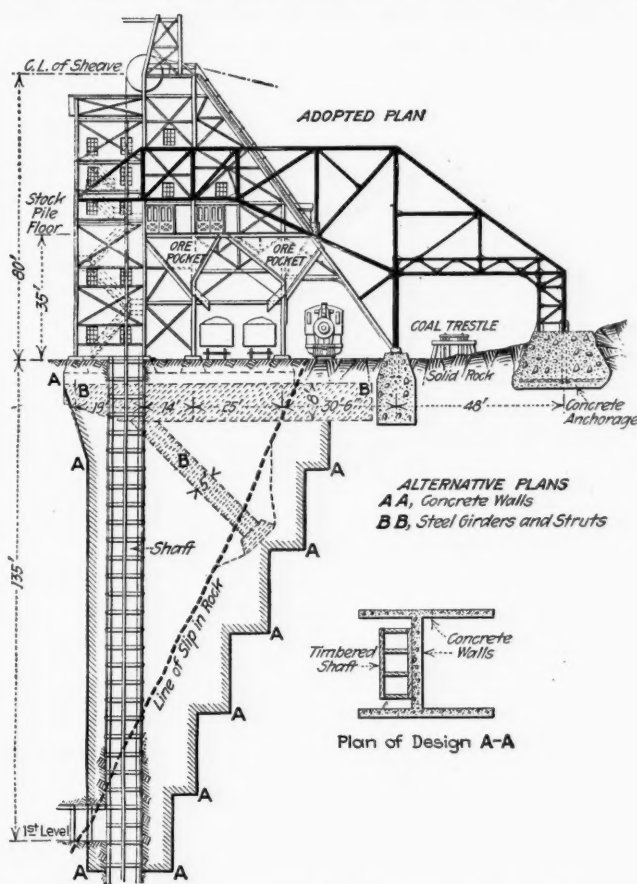
The first plan was to excavate the entire portion between the line of slip and the shaft and construct a vertical concrete wall with two wings, all founded on solid rock. This would extend from the first level in the shaft, 135 ft. below the collar, to the under side of the reinforced-concrete base supporting the front portion of the shafthouse, as shown by dotted lines A—A in the drawing. The wall would carry the entire load of the foundations, tracks, cars, front portion of shafthouse and ore in shipping pockets, and would support the rear portion of the mine shaft from first level to surface.

The second plan was to excavate beneath the reinforced-concrete base and place two horizontal steel girders under it, as shown by dotted lines B—B. The rear ends of the girders would be anchored on good ground back of the slip, and the ends over the shaft would be supported by structural steel struts or columns placed at an angle of 45 deg. and seated on solid rock.

The third plan, which was adopted, was to construct a steel cantilever support, having its footings on permanent ground back of the slip. This carries the portion of the shafthouse above the stockpile trestle, which consists of skip dumps and headsheaves. All main columns

of the shafthouse were disconnected at splices at the stockpile floor elevation, except the rear batter-brace columns, which have a firm footing. The cantilever support thus maintains the headsheaves and skip dumps in permanent position, and the front part of the shafthouse, including the stockpile floor and shipping pockets, now cut loose from the upper portion, will be kept in position by jacking up and blocking the column bases as may be required by ground settlement.

Adoption of this plan was based upon the fact that its first cost was the lowest, and that this structure was above ground, where it could be erected readily and in-



HEADFRAME IS HUNG FROM A GIANT BRACKET

spected easily. As the rear columns of the cantilever support are on solid rock and have an uplift, the pier excavation was made in the shape of a prismoid and the concrete was poured without the use of forms. The concrete pier was made large enough for its weight to balance the uplift due to the weight of the shafthouse portion; the bond of the prismoid in the solid rock is an additional safety factor.

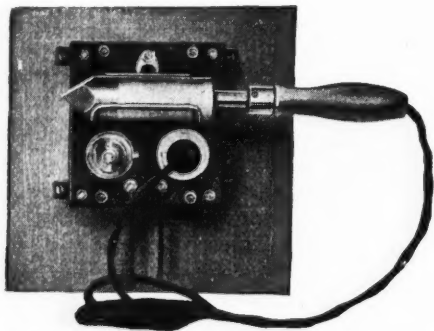
As the mine shaft is constructed of timber sets and is considerably larger than the skips and cages, there is sufficient room for lining the timber guides without retimbering or enlarging the shaft. The cantilever support has now been in service for practically five years, and has kept the upper part of the shafthouse in accurate alignment. The lower portion has settled two feet, which has been taken care of by jacking up and blocking the front column.—*Engineering News-Record*.

NEW APPARATUS AND EQUIPMENT

Automatic Rack for Electric Soldering Irons

Electric soldering irons that are allowed to lie on a bench or other convenient place when temporarily not in use gather dirt and become a hazard. Often the tip will be overheated, necessitating refiling; the heating unit may burn out; the hot iron may set fire to the bench or other material. If the current is turned "off," the iron cools down to such a degree that considerable delay is caused when the tool is again wanted.

To overcome these objectionable features the Cutler-Hammer Manufacturing Co., of Milwaukee and New



PANEL FOR MOUNTING ON WALL, SHOWING METHOD OF SUPPORTING SOLDERING IRON

York, has recently developed an automatic soldering-iron rack and control panel which decreases the amount of current taken by the iron when it is placed on the rack. This keeps the iron from overheating, prevents burnouts and saves current. Furthermore, it encourages orderliness by providing a convenient connection point and support for the iron.

The rack consists of a small slate panel arranged for wall mounting and carrying a support for the iron which acts on the principle of the telephone receiver hook. When the iron rests on the support, or hook, it bears it down and resistance, which is mounted on the back of the panel, is inserted in circuit with the iron. The current is reduced and the temperature held at a safe value, but ready for service and full current as soon as the iron is lifted from the hook.

Taking the weight from the hook disconnects the resistance from the soldering-iron circuit and allows full current to flow. Below the hook, on the same panel, a push-button snap switch is mounted together with a "standard" receptacle, to which the plug of the soldering-iron cord is connected. This little panel, therefore, is a complete switchboard which may be mounted on the wall or machine within reach of the workman. When not in use, and at night, the switch is snapped "off," which completely opens the circuit to the iron.

These automatic racks are designed for use with Cutler-Hammer soldering irons, but they are so constructed that they may be used just as well with other similar types of soldering irons.

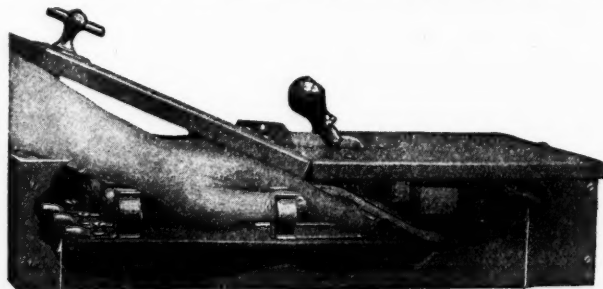
Auto-Lock Safety Switch

In many mines, steel mills, factories and similar industries where most of the workmen have little knowledge of electricity it is desirable to use switches having no live parts exposed or accessible in the ordinary operation of the switches or when replacing fuses.

This is fully accomplished in the Krantz auto-lock switch, marketed by the Westinghouse Electric and Manufacturing Co., which is intended for use on main circuits or wherever an ordinary knife-switch is applied. The switching parts and fuses are inclosed in a steel box, the cover of which is in two parts, one being screwed on to form a permanent covering for that end of the box containing the switch, and the other part being hinged so as to swing back and permit the renewal of fuses, which are located in this portion of the box.

An ingenious latching mechanism makes it impossible to open the cover without first throwing the switch to the "off" position and rendering all fuses and other accessible parts dead. Thus fuses may be replaced at any time with absolute safety. As long as the door of the case is open, the switch contacts cannot be closed.

By using a padlock, the switch handle can be locked in the "off" position, making it impossible for any-



THIS SIDE DEAD

THIS SIDE ALIVE

SWITCH MUST BE PLACED IN "OFF" POSITION BEFORE COVER CAN BE OPENED

one to close the switch, except the person holding the key to the padlock. By using another padlock, the cover may be locked shut, so that the fuses cannot be tampered with. Either of these padlocks can be used independently of the other, so that the switch cover can be locked shut with the switch either "on" or "off," or the switch can be locked in the "off" position with the cover either locked or open.

Electrical contact is made by means of a laminated-spring copper brush, double-ended with auxiliary arcing contacts at each end. The outer leaves of the brush are bronze to provide additional spring pressure.

The stationary contacts are of hard-drawn copper and are mounted on slate bases, one of which in the fused end carries one of the fuse clips while the other

forms the terminal block for the incoming line and is mounted under the stationary portion of the cover.

The operating mechanism, of the toggle type, is galvanized steel and is attached to the under side of the stationary end of the cover. This mechanism can easily be removed for inspection by taking out several screws.

In closing, the pressure between the contacts causes the laminations of the brush to spread apart, giving it a wiping or self-cleaning action. The double-ended brushes provide a double break, dividing the arc between the two ends, each of which is provided with a separate arcing tip.

In the closed position the switch is held in positive contact by throwing a toggle over the center point. A spring provides a quick-break for opening, the mechanism being independent of the operating handle.

These switches are supplied for 250-, 500- and 600-volt circuits, for either alternating- or direct-current service, and in capacities up to 2000 amperes.

The safety features of this switch have been recognized by the American Museum of Safety, which has awarded it a gold medal and special mention.

Service-Restoring Relay System

A new service-restoring relay system has been tried out for a number of months on the lines of several central station companies of considerable size, and the reports received have been satisfactory. The system minimizes interruptions caused by transient short circuits, which clear themselves as soon as the circuit breaker has been opened, thus permitting the feeders to be immediately put back into service. If the circuit breaker is reclosed automatically within a second after the transient trouble has occurred, the service will be restored in time to prevent induction motors from stalling.

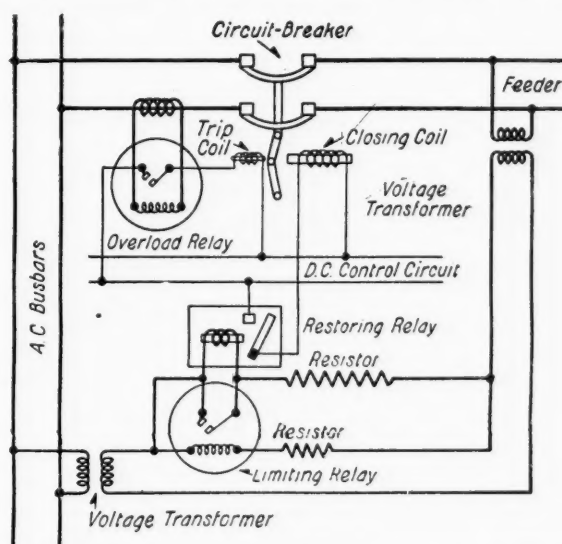
The Westinghouse service-restoring relay system has been developed to perform this operation within the shortest possible time and thus reduce all disturbances to a minimum. This greatly improves the lighting service. Should a permanent defect occur, the system will allow the breaker to remain open until the defect is cleared.

A schematic diagram of connections is shown in the accompanying illustration. Any type of overload relay may be employed to trip the circuit breaker. A voltage transformer on the feeder line outside the circuit breaker is connected so that its potential opposes that of another voltage transformer connected to the busbars. The restoring relay, which is similar to a magnet switch, is connected in series with these two voltage transformers. Before a short circuit occurs, both voltage transformers are subjected to the same condition so that no current will flow through the restoring relay; but when a short circuit develops and the circuit breaker has been opened by the overload relay, current will be forced by the busbar transformer into the feeder transformer through the restoring relay. The restoring relay will then close its contacts, which in turn will close the circuit breaker.

In case of a permanent defect on the feeder line, the restoring relay would continue to open and close the

circuit breaker indefinitely. To prevent this, a limiting relay, similar to the Westinghouse type CV overvoltage relay, but equipped with weaker spring and heavier damping magnets so that its action is sluggish, is connected in such a manner that while the circuit breaker is open it is subjected to the same difference of potential that is operating the restoring relay. Every time the circuit breaker opens, the limiting-relay contacts begin to close and, due to the heavy damping, they do not return to the starting point immediately after the circuit breaker is closed. After the circuit breaker has opened and closed a predetermined number of times, this relay closes its contacts, thus short-circuiting the restoring relay and preventing further operation.

When this system is installed at substations having no attendant, it is often found advisable to have an indicating device that will show when the service has been



SCHEMATIC DIAGRAM OF CONNECTIONS OF SERVICE-RESTORING RELAY SYSTEM

momentarily interrupted. For this purpose, a graphic ammeter is placed in the direct-current control circuit of the circuit breaker. This will indicate whenever the breaker has been closed by automatic means.

A special control switch is used, which contains one dragging contact so arranged that when the circuit breaker is tripped manually the switch automatically opens the circuit between the two voltage transformers.

The service-restoring relay outfit is a valuable addition to the protective equipment of all central stations, and should be especially useful now. This relay decreases power interruptions and thus economizes the time of switchboard and other station attendants, or in some cases releases some of them for other duties.

Hydrocarbons are decomposed or cracked by heat. Carbon and hydrogen are the ultimate products when cracking is carried to the end. The decomposition is a complicated process, the exact mechanism of which is not known, but it is governed by the laws of physical chemistry. Equilibrium conditions determine the extent to which cracking occurs, and the values of the equilibrium constant depend, among other factors, upon the temperature and pressure. High temperature favors cracking because most of the reactions take place with absorption of heat.—*Bureau of Mines Bulletin No. 135.*



Operators Contradict McAdoo

Issue has been taken with Director General McAdoo as a result of some of his statements on the supply of cars for coal mines, made in his report to the President. Among those challenging the purport of his report is the National Coal Association. Mr. McAdoo's entire statement as to the coal movement reads as follows:

Just at present strenuous efforts are being made to speed up the movement of coal so as to preclude the recurrence of the distressing experience of last year. In both the production and transportation of coal 1917 was a record year. Including bituminous, lignite and anthracite the production was 650,000,000 tons. Of this some 11,563,056 cars, containing about 558,000,000 tons, were transported by the railways. The balance was either consumed or converted into coke at the mines or near by. During the bad weather in January, 1918, when the railroads were practically at a standstill, there was a reduction of 79,131 in the number of cars of coal loaded and moved as compared with the year 1917. Notwithstanding the continued bad weather in February, 1918, the railroads got on their feet and increased over February, 1918, 31,250 carloads of coal. In March the increase was 46,613; in April, 73,408; in May, 84,998; in June, 88,840; and for the first four weeks of July, 113,198 cars. It will be seen, therefore, that for the last six months the increase in coal carried by the railways has been 437,976 cars of coal—equal to about 21,998,800 tons.

One of the great advantages of governmental control is that the transportation facilities of the country can be concentrated upon the quick performance of an urgent duty. The energies of the Railroad Administration are now being largely devoted to moving the coal mined as rapidly as the Fuel Administration can deliver it.

Of late cars have frequently been supplied to the coal mines more rapidly than they have been able to load them and it is probable that adequate transportation for the fuel requirements of the Nation will be available provided the coal production during the warm weather can be maintained at a point that will fully employ the cars requisitioned. The country has been led to believe that coal production is limited entirely by transportation and that any shortage is due to the railroads. This is erroneous. The maintenance of an adequate coal supply depends in the first instance upon production which in turn is restricted by shortages of labor and other causes aside from transportation.

The situation, as viewed by the National Coal Association, is very different. Its statement is as follows:

So far as the car supply for bituminous coal loading is concerned, Mr. McAdoo apparently has not been informed fully as to all the facts in the case. It is true that in certain sections of the country the supply of empty cars furnished bituminous coal mines has shown marked improvement during the summer months; and the industry as a whole also has enjoyed an increased car supply. This supply, however, is by no means adequate when the whole industry is considered, as the government's own figures show.

These figures, made public by the United States Geological Survey, which keeps a careful record of coal production and the causes curtailing such production, show that during the latest week covered by returns from producing fields, that of Aug. 24, car shortage cut production no less than 1,530,000 tons of bituminous coal. In four fields alone—Southern Ohio; Somerset County, Pennsylvania; Fairmont, W. Va., and the high volatile fields of southern West Virginia—the bituminous coal mines lost 750,000 tons during the week because the railroads failed to furnish cars to load this tonnage. Director General McAdoo certainly did not have these fields in mind when he reported that "cars have frequently been supplied to the mines more rapidly than they have been able to load them."

One coal-producing company in West Virginia, whose output of byproduct coal is made into coke and in that form is used in the production of steel, lost 100,000 tons during the month of August because cars were not furnished to load and haul this tonnage. This loss was directly reflected in the curtailment of steel intended for ships at a time when the output of steel plants was being reduced because of their inability to obtain sufficient fuel. Another company in the gas coal fields of western Pennsylvania ran part time and lost 170,000 tons production of coal because of the inadequate car supply.

Shortage of railroad cars at the bituminous coal mines of the country has curtailed production not less than 82,000,000 tons since Jan. 1 last, and stands as the dominating factor of all causes of curtailment. Much of this huge production lost to the country because the railroads did not furnish the coal mines sufficient cars occurred during the months of January, February and March, when the railroads were recovering from the worst congestion in their history and from the effects of unprecedented storms, but not all.

Car shortage cut bituminous coal production 1,934,000 tons during the week ending Aug. 17; 1,559,000 tons during the week ending Aug. 10; and 1,145,000 tons during the week ending Aug. 3. These figures do not support a claim that the coal mines are receiving more cars than they can load, even recently.

The production of bituminous coal from Jan. 1 to Aug. 24 inclusive, totaled 384,000,000 tons. The mines that produced this coal were capable of producing 522,000,000 tons under full time output. The total production lost from all causes was therefore 138,000,000 tons—far more than enough to afford a guarantee against a fuel shortage. Here are the reasons why this 138,000,000 tons were lost:

Because of car shortage, 82,000,000 tons; because of labor shortage and strikes, 22,750,000 tons; because of mechanical disabilities and unavoidable shutdowns at the mines, 19,750,000 tons; because of no market (chiefly in southwestern states) 4,000,000 tons; all other causes, 9,500,000 tons.

It will thus be seen that car shortage, the dominant factor curtailing bituminous coal production during the year, was responsible for approximately 60 per cent. of the total production lost from all causes.

These figures are not guesswork. They are the government's own figures, as published by the Geological Survey. They show conclusively just what did limit coal production.

Operators Advised to Obtain Deferred Classification for Employees

The War Department has provided the necessary machinery for the protection of essential industries such as mining from the indiscriminate operation of the draft, and depends upon the companies and individuals to protect their industries by taking special care to see that skilled labor which cannot be replaced receives the proper industrial deferred classification. Mining organizations producing necessary war minerals should consider it a patriotic duty to attend actively to this matter at once and to take up with their local boards the classification in the draft which their keymen should receive, Van H. Manning, director of the Bureau of Mines, declares.

The Army desires to have every man who can be replaced put into a classification where he will be ready to carry a gun as soon as called for, but does not wish to take men who would be more useful for war purposes where they are. Should those engaged in the conduct of essential war mines not carry out this duty promptly, the War Department may naturally hesitate to furlough back men from the army in cases where the companies have neglected to ask for the proper deferred classification for their men as provided for under the selective draft regulations.

Machinery has also been created whereby in some instances the keymen in essential industries who have failed for any reason to receive industrial deferred classification may still be returned to their work by the Adjutant General of the Army after their arrival at camp. Under this arrangement, the different departments and bureaus representing certain industries may designate a certifying officer, who may recommend to the Adjutant General that the soldier in question be granted an indefinite furlough without pay and ordered to report to the industry where his services are needed.

Chief Coke Inspector Appointed

R. C. Glazier, of Johnstown, Penn., has been appointed chief coke inspector for the Fuel Administration. It is the intention to centralize the work being done for the improvement in the quality of coke. Mr. Glazier will also concern himself with the matter of conservation of fuel and increase of production.

Coke Company To Make Large Refund

The Fuel Administration's statement concerning the \$80,000 refund which it has required the Consolidated Coke Co., of Pittsburgh, Penn., to make, is as follows:

A refund of a sum approximating \$80,000 was arranged Sept. 7 by the United States Fuel Administration between the Consolidated Coke Co., of Pittsburgh, as party of the first part, and the Steel Company of Canada, of Hamilton, Ontario, and the Thomas Iron Co., of Hokendauqua, Penn., as parties of the second part. The refund came as the outcome of the delivery of inferior coke to the two companies of the second part.

The Consolidated Coke Co. had contracts providing for the delivery of coke made from washed coal to the blast furnaces of the other two companies. Last November the Consolidated Coke Co. washery broke down and shortly thereafter burned, rendering the producers unable to ship coke of the quality contracted. Also, in order to secure

maximum output, the coke company had installed coke-drawing machines which enabled them to maintain the regular output of coke, but, as appeared, reacted unfavorably on the quality of coke produced.

It was clearly evident to the Fuel Administration that both the iron companies had been seriously damaged, not only by increased fuel consumption but also had been unable to meet the requirements for metal of their respective governments.

The Consolidated Coke Co. agreed to pay to each of the other companies a sum amounting to \$1 per ton for each ton of coke shipped to them from June 1 to Aug. 15. Also it agreed to rebuild its washery at the earliest possible date.

The sum involved, while large, in no way represents the loss sustained by the furnace companies and, of course, the national loss due to the curtailed tonnage of iron and steel cannot be calculated in dollars and cents. It is the belief of the Administration that the exercise of its power to maintain the standard of quality of coke, by control of prices, will result in more vigorous efforts on the part of all coke producers to use their properties to the utmost extent to aid in the effective prosecution of the war.

Work-or-Fight Order Has No Application in Coal Mining Industry

The "work-or-fight" order does not apply to any employee of a coal-mining company, General Crowder, the Provost Marshal General, has informed the National Coal Association. Where local boards notify clerks or any other employee of a coal-producing company that they must seek other work, the fact is to be communicated at once to the Provost Marshal General.

Criticized for Attitude on New Mines

Considerable criticism is being aimed at J. G. Jones, of the Fuel Administration, and his committee charged with the licensing of new mines. It is contended by some that the few permits which are being granted are threatening the future coal supply. Mr. Jones admits that a change of policy may be necessary if the war should be greatly prolonged, but for the present he is fully determined to allow no new mines to open which will influence production in mines that are already producing.

With the steel situation in its present shape, Mr. Jones declares that no machinery can be spared for mines not in a position to use the equipment for immediate production. There are, of course, some permits being granted where exceptional conditions make large production possible in the near future.

In those sections of the country where the railroads are not congested, and where idle machinery, in many cases, can be rigged up to do the work, the same stringency is not being exercised as is the case in the coal fields of the East and of the Middle West.

The cost of handling cars of coal diverted from their original destinations to relieve an emergency may be added to the regular freight charges, the Fuel Administration has ruled.

A service flag containing 50 stars was hoisted over the Fuel Administration building at noon Sept. 6. Dr. Garfield, who has two sons in the service, delivered a brief address to nearly 1000 of the employees of the administration.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

We reproduce in the panel on this page the remarks of P. B. Noyes, director of the Bureau of Conservation, of the United States Fuel Administration. Against it and almost around it we write the answer of the anthracite mine workers. Apparently they are willing to accept the awful sacrifice of life and limb of which Mr. Noyes speaks. We shall face the foe partly armed, partly munitioned, and merely because a wage readjustment is sought by the anthracite mine workers, an adjustment that is in violation of their pledge given only at the close of last year. Though they had a contract at that time a readjustment was made in their wages, yet now they are striking again, despite the fact that their arguments are being considered by the Department of Labor and the Fuel Administration.

Are the mine workers of the anthracite region willing to take on themselves the blood of the slain by striking at this time in violation of their pledge? It seems as if they are. On Sept. 8 four collieries of the Delaware & Hudson Co. in the Wyoming valley were closed down by a strike of motor runners, drivers and doortenders, and at two others the same classes of men were, at that date, threatening to go on strike. The four mines when operating employ 1500 men, the other two employ 1000 more, so 2500 men will be involved if the strike spreads.

The motor runners want an advance of 15c. per hour; they now receive 35c. The drivers get 24c. and want 35c., while the doortenders, who are paid 12c., are now asking 24c.

The miners at one of the Panther Valley operations have gone on strike for an increase while the men in the Hazleton region are pressing for extra pay for overtime and have inserted paid advertisements in the local papers telling the men at certain mines to be careful not to do Sunday work. The union is counseling patience and the fulfilling of contracts, but the men are wrath with the union, and condemn it more heartily than they do their employers.

The strike for free transportation at the Sandy Run colliery of M. S. Kemmerco and Co. still continues. When the men struck the company announced a shutdown for repairs. This is probably not altogether a move of strategy. It may merely show that the company, anxious to make repairs, thinks the present time favorable. The mine has had some severe squeezes in recent years, and repairs are possibly quite necessary. The men, though dispossessed, are not idle. The labor scouts of the companies operating in the neighborhood quickly lighted on these men and they are busily mining coal in nearby workings.

The northern Pennsylvania coal fields in the neighborhood of Blossburg, Tioga County, are still busily at work though few, if any, sections of Pennsylvania have mined bituminous coal longer than Blossburg and the vicinity.

The Blossburg employees of the Morris Run Coal Mining Co. and O'Donnell Brothers Co. have asked that a work train be run from Blossburg to the plants of these companies.

The mountaineers of West Virginia and Kentucky are justifying the motto of the first state—"Montani semper liberi" (the hill country people are always free), by strenuous efforts to aid America in her struggle for liberty and justice. They have the most intense kind of patriotism. E. E. White, president of the E. E. White Coal Co., which operates in the hill country surrounding the Virginian Ry., pays a high compliment to the miners of his district and to the patriotic attitude of the people in general. He has been

appointed production manager in the New River and Winding Gulf fields and seems to find great pleasure in the work, owing to the support given the movement by the workmen everywhere. White is not the kind of man to go round with a grievance. He sees the big things, publishes them, and big things spring up by the spreading of the seed.

Some people plant blame and discouragement and wonder that their row grows such spindling corn. After Mr. White had visited the many mines in his care he described his impressions thus: "In traveling through my district I saw miners wearied by a long day's work going back into the mine to produce more coal on the night

shift. A desire to do their bit has caused the farmers to go into the mine at night and load coal. As one farmer expressed it, 'I raise wheat during the day and load coal at night to aid our boys in France.' A preacher and his congregation volunteered one night last week to load 100 tons. A worn-out miner has written saying, 'I have finished my mining days, but I'm going to pay some one to do a day's work for me.' Mr. White concludes by asking, "In such an atmosphere as this do you think there is any room for a slacker to exist?" There's good blood in the "sagers" and good blood is bound to tell.

But the mountaineers look askance at your strolling players and mountebanks. A carnival company operating near one of the big coal mines in southeastern Kentucky interfered with production. It was summoned before the Harlan County Council of Defense, with Judge Onthank presiding. When it was testified that the production of the district had fallen by reason of the operations of the carnival company, the "attraction" was ordered to move into another district. It was found that there were two draft evaders in the troupe, one a British subject and the other a man from Missouri. Both were held. Triflers are not wanted where men are mining coal for the soldiers at the front.

At Jackson, Breathitt County, Kentucky, R. T. Gunn, the vice president of the Riverside Coal Co., has put the matter to the men in this way: "During July the Riverside Coal Co. has killed more Huns than in any months in its existence, and in August it will kill more than in July." Mr. Gunn declares that he's surely fully justified in his

WE CANNOT fill Pershing's orders in full because the United States cannot make sufficient steel this winter. A shortage in steel results almost entirely from lack of coal. Keep this in mind and then look forward to the events of the coming spring. We shall have the drive. We shall succeed in it, but some time in February or March, or whenever the time has come, General Pershing will sit down with a pencil in hand and will figure up the exact deficit in the filling of his orders for munitions. With military formulas now well recognized, he will figure in place of those munitions how many extra men must be put into the battle to be killed. This is no fanciful statement. It is now possible to treat, in any aggressive movement, the question of munitions or of casualties as interchangeable quantities. So many thousand American youths must be thrown into the hopper for every thousand tons of munitions which are short.—P. B. Noyes, Conservation Division, United States Fuel Administration, addressing engineers at Cincinnati, Ohio.

statement, for all his coal goes for war work. For several months practically the entire output of the mine was shipped to Wright Brothers' aeroplane works. The output now largely goes to a plant making aeroplane parts and to a utilities company.

A Kentuckian Advocates Bonuses

Writing, as he says, "with some misgivings," a Kentucky general manager unburdens himself on the subject of bonuses as follows: "Bonuses are a great stimulus to production, and I cannot understand the attitude toward them taken by the United Mine Workers of America, much less can I fathom the reasons which have caused the Federal Fuel Administration to give support to the hue and cry against the bonus. I would like to see a discussion of the subject in your journal.

"I can readily see how the miners' union may object to a low and inadequate wage being supplemented by a bonus when it might be more reasonably corrected by a revising of the scale. But the objections are not equally strong when the wage paid is adequate and when the supplementary payment is not made to remove what is in the nature of an injustice. The wage advance that was recently granted satisfied the mine workers, and they were willing to mine coal under it. The bonuses were added not to satisfy the mine workers and not to bring their compensation up to a level of adequacy, but to induce them to produce more coal than in the past.

"I can not see any harm in a bonus such as granted, still I am willing to concede that a flat bonus paid on each and every ton mined, whether few or many, would cause a chaotic condition, because it would mean that every operator, by adjusting the bonus, could pay any rate he desired. This practice would completely disrupt the labor market in our industry. A bonus on coal mined in excess of a normal tonnage is vastly different. It means that more coal will be mined with a given supply of labor and that the miners will earn higher wages. If it is to be said in reply that by excessive work some of the men will do themselves an injury, the answer is that the eight-hour day and the limitations of the car turn prevent that probability.

"Let me illustrate my remarks by citing a specific case. In a certain mine with which I am familiar, it was found that the men were producing 5 tons a day, or 30 tons a week. In order to encourage them to work more regularly and energetically, thus increasing production, the owner notified the men that he would pay a bonus of 10c. per ton for all coal mined in excess of the average of 30 tons per man per week. The result was most gratifying. The average production was raised 20 per cent. In certain individual instances the increase was much greater. Some skilled miners increased their weekly production 100 per cent. This mine had never been able to operate on Saturdays because it could not induce its employees to enter the mine on the concluding day of the week, yet after the bonus payment was introduced 80 per cent. of a normal run was obtained on that much abused day. Bonuses have recently been discontinued because of the attitude of the Fuel Administration.

"Of course, we should look at the matter from all sides, that of the individual miner, the operator and the public. The first delivers more than an average tonnage and he is entitled to an exceptional price for the coal he mines in excess of the general average. It seems to me that the extra income gives him hope for better things, permits his indulging in comforts otherwise beyond the compass of his purse, opens up to him opportunities for investment and encourages him in the purchase of Liberty Bonds and War Savings Stamps. The bonus stimulates the exercise of those virtues that bring success. It is quite sound in principle and the end which it seeks is in line with the Government requirements for fuel.

"I have heard it contended that if the companies can pay bonuses they can pay higher wages. This argument is plainly unsound, for bonuses are paid out of the lower overhead costs resulting from increased production. This is especially true in this war period. Mines designed for

large tonnages have overhead expenses in proportion to the output for which preparation has been made. If the output falls or fails to reach that level, the overhead expense per ton mounts to an alarming figure.

"Am I justified in believing that the miners' union desires to discourage individual effort and for this reason opposes itself to the bonus system? Is it not the purpose of the union to put all men into a straight-jacket, restricting their production to a certain figure? America should mean to the miner 'equality of opportunity and a chance to rise in the world by personal effort.' No miner should feel his wage so regulated to the average wage as to leave him no hope beyond and above his working place. Where men are disposed to earn and save capital they should be given an opportunity, and such opportunity is afforded by bonuses for increased production. Every man who is disposed to replace hand labor by brain labor should be allowed to avail himself of all the chances offering themselves to him.

"Bonuses reward the miner for the additional effort which he makes to increase the coal tonnage and help obliterate the gap in the ranks of the miners caused by the draft. The stopping of bonuses is sure to retard the production of coal at a time when the maximum supply of fuel is absolutely necessary to the success of the war."

Local Would Single Shift Gassy Mines

Claiming that the mines of the Crowsnest Field are too dangerous for continuous day and night operation, members of the Gladstone local, No. 2314, United Mine Workers of America, have petitioned the Minister of Mines of British Columbia to make the single-shift system compulsory in all the coal mines of the district. In support of their demand the local quotes the report of George S. Rice, of the United States Bureau of Mines, who made a special investigation on the Crowsnest coal area on behalf of the Provincial Government. The petition draws especial attention to his observations respecting the gas flow at mines in certain parts of the field. The coal operations of the Crowsnest region are located in what is termed, under the classification of the United Mine Workers of America, District No. 18. This district covers the mines of Eastern British Columbia and Alberta. The direct control of the Dominion Government, which is represented by Commissioner W. H. Armstrong, extends all over this district. Consequently it is probable that the request of the mine workers of the Gladstone local will go before the latter official for decision.

The document setting out the case of the mine workers begins with the assertion that the movement for single-shift operation was inaugurated solely because of the desire to secure greater safety in the mines at Coal Creek. It adds that conditions in the mines were so abnormal and so baffling to the engineering talent of the province that the Government felt compelled to obtain outside advice in order to prevent any further continuance of the appalling loss of life. George S. Rice is quoted as follows:

"On page 340 [of the Rice report] a statement is made that the gas flow from No. 1 East when the mine was idle was found to reach the astounding amount of 1,795,680 cu.ft. per day. When the mine was working 4,184,600 cu.ft. were given off, there being approximately three times as much gas flow when working as there was when the mine was idle."

Against these figures is held up, for purposes of comparison, the amount of gas used per day by the 11,000 citizens of the city of Medicine Hat, Alta., which amounts to 3,000,000 cu.ft. The document further maintains that gas-flows, blow-outs and bumps in the Crowsnest coal field "have invariably happened on the afternoon shift." This, it is contended, bears out Mr. Rice in his statement that the mines are being developed "too continuously or rapidly." The conclusions finally reached are that "such ground be only advanced at a moderate rate—say one shift in 24 hours." The mine workers say that while they cannot determine the terms of their employment, they can point out to the Government that it has a share in the responsibility for their safety and that they will be compelled to place

the onus on the Government in case a fatal accident arises out of the conditions stated.

While no exception is taken to the men's statements insofar as they have quoted Mr. Rice, it is maintained officially that, great as the gas flow is in the Crowsnest coal field and exceptional as are the conditions, the story has lost nothing in the telling. It is pointed out that conditions have materially changed since the expert from the United States made his investigation. The gas flow per 24 hours now, for instance, is 2,397,600 cu.ft. instead of the 4,187,600 cu.ft. given and it is declared that, "astounding" as these figures may appear at first blush, the conditions at No. 1 East Mine now are not nearly as dangerous as the petitioners would represent.

The safety of a mine is measured, according to the respondents, not by the gas flow so much as by the percentage of gas in the air currents. The mine officials say that looking at the situation from this viewpoint conditions will not appear so bad for while there is a gas flow in No. 1 East Mine of 1665 cu.ft. per minute there is a flow of 143,640 cu.ft. of air per minute in the main return airway. As a result, according to reliable statistics, the actual gas content of the air current is 1.16 per cent. Further it is pointed out that, among other steps taken by the Government to protect the men, is the regulation that immediately tests disclose the presence of gas measuring 2.5 per cent. or more the men in the working places affected must be withdrawn from the area so charged.

MINE POPULAR DESPITE ALLEGATIONS AS TO SAFETY

There are six other mines controlled by the Crowsnest Pass Coal Co., namely, No. 1 South, No. 1 North, No. 2, No. 3, "B" North, and No. 9. With the exception of No. 1 South, which is about as gassy as No. 1 East, the gas content of the air of these mines runs between 0.04 and 1 per cent., but the coal is harder. All of these mines are now operated by single shift, or, to speak more correctly, there was but one shift in these mines in 24 hours at the time of writing and even under these conditions there were a few weeks ago, and presumably still are, idle working places. This is due, of course, to lack of labor and this shortage is considered especially serious because the colliery is understood to have orders for 8000 tons of coal a day and is able to produce approximately only 2000 tons. But it is also thought to be somewhat remarkable that No. 1 East Mine, with which the petition deals specifically, is the only mine which it is possible to work on double shift; in other words, that it is the most popular mine of the Crowsnest district, despite the allegations made as to its safety. The question has been asked: Is its popularity due to its soft, easily-mined coal? Of course the easier the coal is to work the more can be mined and the higher the wages. The question is finally put thus: If the men are so eager to work in this mine that they fill up both shifts and will not fill a single shift at the other mines, would they be willing to be deprived of the opportunity of working at this mine if the Government should accept the union's suggestion? Obviously many men will have to be displaced if No. 1 East is to be run single shift as suggested.

Watkins' Letter to His Mine Foremen

From T. H. Watkins, the president of the Pennsylvania Coal and Coke Corporation, the mine foremen of that company have received a letter, urging them to do their part in the production of tonnage and promising them plenty of assistance in performing their duties. This letter runs as follows:

"You have no doubt read the proclamation of the President to all engaged in coal mining. Nevertheless, even though you have read it before, please read it again carefully.

"The President is our commander in chief; therefore, upon him is the responsibility, and we must assume that he is thoroughly familiar with all conditions, particularly those surrounding the supply of coal and its importance not only in assisting to win the war, but in aiding us to

win it as speedily as possible, thereby lessening the loss of life.

"In this emergency there are probably no officials on our staff who are more important than the mine foremen, for they are directly in charge of the mines. Upon the mine foreman depends almost entirely the success of the company in securing the coöperation of all of the employees. He must possess courage; he must possess brains and the will to use them, and, of course, a familiarity with the best methods of mining. I want to speak frankly to the mine foreman and to say that I can readily see that at times in a large organization he may not feel that his work is properly appreciated, either by a recognition of the value of his ideas, or by a proper compensation for the work that he is called upon to perform. For that reason he may not work at times with quite the spirit and will that he would exhibit if entirely contented. I recognize that in some cases miners are making more money than the mine foreman over them. We have always considered that the mine foreman who was efficient and attended to his duties had a permanent position and was not subject to such fluctuations in earnings as is the miner. I am giving special attention to the subject of proper compensation for our mine foremen. In the meantime, I ask each of them to remember in what an important way his job promotes the interests of the Nation, and I trust that as far as compensation is concerned the matter will be worked out satisfactorily.

"With the scarcity of labor from which we are now suffering, and which will be accentuated by the draft, the necessity for handling labor to the best advantage is, in our experience, greater than ever and, in my judgment, the mine foreman should keep the following points in mind: 1. To get and keep in personal touch with every one of the men under him. 2. To see that all working places are kept in proper condition. 3. To give special attention to the subject of ventilation, as men cannot work with full efficiency in poor air. 4. To see that all supplies needed by the miner are promptly furnished and placed where they are easily accessible to him. 5. To see that all mining machinery is kept in the most efficient condition and used to the best advantage. 6. To see that all locomotives and cars are kept in the best possible condition, repairs promptly made and cars properly lubricated. 7. To see that all mine tracks, and their electric bonds, are kept in perfect condition.

MINE FOREMEN SHOULD WELCOME ASSISTANCE OF OTHERS

"In order to give himself full opportunity to use his brain to the best advantage, the mine foreman should ask for such assistance as is necessary for the satisfactory operation of the mine. We have recently placed section foremen under the mine foreman's charge, it being our intention that one section foreman shall not have charge of more than 25 men, each section foreman, of course, reporting to the mine foreman. These foremen should be of great assistance to the mine foreman in making out his reports, from which he can study his plans for efficiency and operation.

"At many of our mines men are laying off for various reasons, some of which are inexcusable. The mine foreman should study with the mine committees, now being appointed, the best way of correcting the habit of delinquency and how to secure the coöperation of the men in the effort to mine more and cleaner coal. When punishment is administered for delinquencies of any character, it should be done with great care and judgment and only after the mine foreman is satisfied that such punishment is well deserved.

"I think the miners as a whole now fully appreciate how important is clean coal for the efficient service of the Nation. The mine committees, I believe, will readily recognize how important it is. All the officers of the miners' organizations have said that a man who at this time loads dirty coal is a traitor to the Nation. However, where it is impossible for men to load clean coal and get out a quantity sufficient for them to earn fair wages, an investigation should be made, and the question taken up with the division superintendent as to whether the men so situated should not have an allowance made while those conditions prevail.

EDITORIALS

A Kentuckian Advocates Bonuses

A STRIKING feature in the Labor Department of this issue is a letter from a general manager who is in charge of big mines in Kentucky. The communication presents arguments in favor of the much-abused bonus, though we do not believe the writer need have any misgivings about the propriety of making public his defense of a proper bonus system. We do think, however, that he is a little unfair to the union, for since the war commenced the United Mine Workers of America, as a body, has been a frank supporter of increased production.

Opposition to bonuses arises from two sources. The operators oppose such bonuses as are planned for the purpose of inducing men to change their places of work. Bonuses introduce competition for labor and increase the labor turnover. Also, they reduce the margin of profit to too low a figure. Mr. Garfield rests his objection on the same basis. In his fulmination against these provisions on Aug. 5 he said: "Information is reaching me that coal operators are bidding against each other for labor by means of bonuses. This evidently causes unrest, and it shifts, but does not increase the total production of coal."

The union objects to bonuses because it claims the bonus is recognized only as a temporary concession, and one to be revoked at pleasure. It is regarded as a free gift of the operator, and the union does not approve of such gifts. The union's slogan, if we may make a guess at it, runs thus: "No good gifts are obtainable without the good offices of the union." The operator who pays a bonus is like the stranger who gives the youngster a dime and thereby convinces him that his father is parsimonious should he refuse to do the same. The union does not approve of free-will offerings of any kind. When these are being distributed the union is liable to be confronted at any time with the criticism, "There is a dollar that you overlooked."

Discontent between those earning bonuses and those not earning them, and not located at mines where they can earn them, adds to the embarrassment. We really believe that if the union could, by actual contract, force the operator to pay a bonus for all tonnage mined above a certain amount, and so could obtain credit for the change and at the same time could make the modification general, it would be disposed to stand sponsor for it. It could not then be charged with laxity, and there could be no heartburnings between the members of the union because some received it and some did not; being general, the bonus would not increase labor turnover.

As is pointed out in the letter referred to, the bonus is, in many cases, really earned. The operator who gets the larger tonnage is helped to lower his operating costs. When a man works until quitting time the flow of coal is rendered more equal through the full eight

hours, and conditions are favorable for a maximum use of the mine force. Nothing is more wasteful than the drag in operation after the noon hour. Men scurry everywhere trying to find enough coal for a trip. As soon as work begins to lag and the roadway is full of the lights of departing men, the trips are but half as large as in the morning rush hours. Usually the mine is shut down before the full day has run its course, but when men are scarce the day force is kept on so as not to discourage the men; and when coal is at a premium the day men are sent around hunting cars because the steady miner must be rewarded and every ton available secured.

We have said that the bonus is, "in many cases," really earned. In some mines, however (at least after the war is over), the operator will find himself less able to profit by a large tonnage from each man, for he will have men enough to keep the flow of coal going at full force without any such large unit production. A bonus, then, may make it essential for his financial stability to keep unit production below the level at which the bonus begins and make him as anxious to restrict tonnage as he is now to encourage it.

That is looking far ahead, and some will contend that so long as the bonus is kept around 10c. per ton and is arranged to start at a reasonable figure really representing average production it will almost always be amply earned whenever and wherever it is awarded. How many general managers in Kentucky and elsewhere have longed for a full eight-hour day, with full trips and a sure flow of coal? And in the stub end of the working day how much coal might we not haul with the force of labor on hand if only the miners observed the appointed hours as well as their fellow mine workers?

When the Goddess of Liberty Speaks

IN THIS ISSUE appears a colored insert to call the attention of our readers to the coming sale of Liberty Bonds. The war has put our artists as well as our mechanics to the test. Uncle Sam is no longer the beaming, genial, if somewhat bizarre, gentleman he formerly was: Columbia has surrendered some of her grace while gaining force of character, and here is the Goddess of Liberty full of cares and trouble, though strong in purpose and in courage.

The countenance of the nation is changed, as have been also the faces of its great symbolic figures. The great mission with which we, with our Allies, are charged—no less a task than to give the world a new birth in freedom—has added a new seriousness to our outlook, and has given us an idealism to which, at one time, we believed ourselves to be strangers.

After all there is something larger than money in this world. There are purposes which far transcend personal advantage and private gratification. The war has

shown us that our money and our labors have value only as they promote worthy ends. They are the instruments of service and not merely the playthings of pleasure.

We are asked to invest our money in liberty, freedom of trade, freedom of travel, democracy and honor. And we will invest it freely, for, if we win this war, the world makes a step forward on the road of human brotherhood. Law is henceforth to be founded on the consent of the governed, and is the strong man which, entering the household of this world, will despoil war of its ill-gotten goods.

The appeal to invest is not made on the basis of the interest paid or on the ground of the security offered, though both are ample. National loans are not being floated on these narrow grounds. People said when the war first started, back in 1914, that a loan of a billion dollars would bankrupt the strongest of nations. They reckoned ill who cast up their column without adding in the forces of patriotism. Those ideals never proved stronger than they have done of late in the sale of Liberty Bonds. Each issue has been a revelation of the national solidarity. It has convinced us that there is between man and man a cement of mutual interest and esteem that will stand almost any strain.

We shall put aside the pleasures our wealth can buy that we may see the wonders our wealth can perform and the good our wealth can effect. We will deny our bodies that we may feed our spirits with a new vision of noble achievement. We will be narrow in detail that we may achieve a stupendous result. Every little economy, every little denial will be devoted to filling the golden stream of effort that is setting full from our Atlantic coasts toward the battle line—victory line—in France.

This Is the Day of the Spoken Word

A TIME of increased democratization is at hand. Unless the mine official is prepared to do his duty as a mold of public opinion the floodgates of order and fair play are apt to be swept away. More and more we shall find that it will be necessary for the managers of our mines and factories to be leaders of men, able from the platform to place the right cause in the right way before their men.

Someone complained to Sankey that his songs were set to the Devil's music, and he responded that he did not propose to leave all the best tunes to the Devil. Similarly oratory has been used by men of Bolshevik tendencies, but it is a weapon that can be drawn in a good cause as well as in a bad. When labor feels its power and uses it the only weapons of defense will be the oratory of those whose outlook is broader, painful experience and general reading. Perhaps the most potent of all these forces and the least harmful in operation will be the oratory of the natural leaders of men. Happy will be the time when we can argue our difficulties to a conclusion rather than force a result by strikes, lockouts, discharges and wars.

In the matter of oratory the welfare and safety men are showing the way. They will not absorb the whole stage, however. After a while the operating officials will realize that the platform calls as insistently on them as on any one else.

Electrification Not a War Necessity

MANY ARE THE problems in electrification from coal-mining centers which we will have to work out carefully in times of peace. There is no doubt that, when that time comes, they will be solved quite successfully. The extremists are already quite sure of their ground, but until more work has been done and until the end of the war makes experiments safe the public will prefer to do nothing revolutionary. The electrification of railroads is one of these problems.

The Norfolk & Western Ry. electrification has reduced the cost of freight movement per ton 26 per cent. and increased the volume of traffic 50 per cent.—a noteworthy result. This does not agree with the views of the ardent propagandist. He would suggest that a gain of two-thirds is possible. What gain has been made has arisen largely from the fact that the capacity of the railroad in question had reached its limit under steam operation. By replacing steam by electricity as the motive power a larger tonnage has been attained with consequent saving. It is thought that, had the railroad been electrified in 1905, the change might not have paid; that had it been electrified in 1910 there would have been no marked saving. It is because the business done since 1915 has been large that electrification has so clearly justified itself.

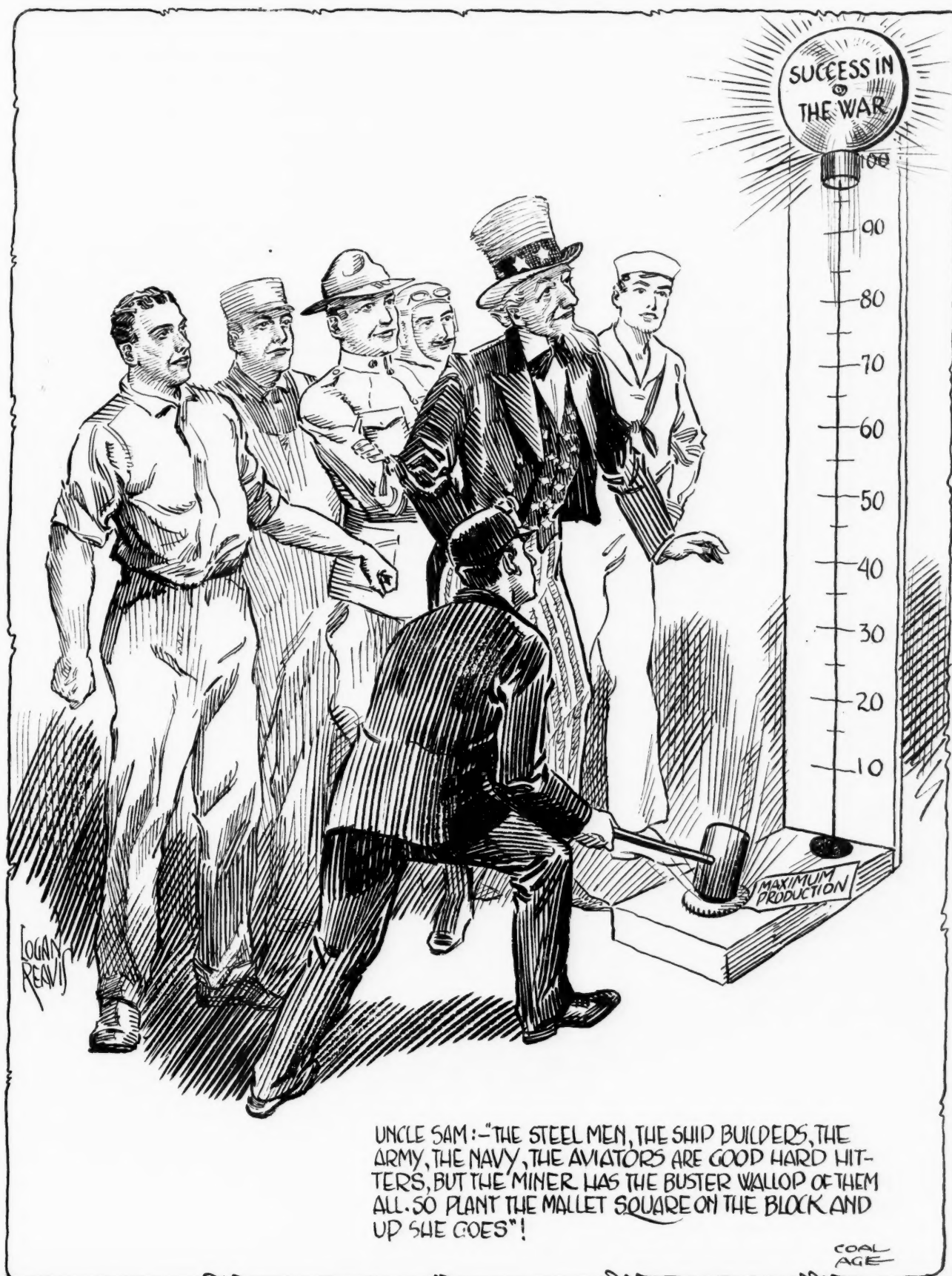
Before the tonnage handled was held down to a certain maximum by the difficulties in operating the Elkhorn tunnel, and it will probably in the future be strictly limited by the restrictive capacity of that critical point.

In order to make the electrification economically feasible it has been necessary to take special precautions to prevent too high a load factor. Portable telephones have been installed permitting the conductor or the engineer of the leading locomotive to notify the power director that the train is made up and ready to start. However, the train dispatchers are not advised by the power director unless the train is to be held more than about ten minutes.

By such careful adaptation of means to ends the installation has been so successful that the Norfolk & Western is extending it twelve miles from Vivian past Welch to Farm, and also five miles from Welch to Wilcoe. The electrified road will then be 41 miles long. But with all its experience the railway is not electrifying the stretches between Williamson and Farm—70 miles—and between Bluefield and Roanoke—106 miles. The complete work will come in time doubtless, and it will then be justified in the results attained; but for the present the installation of another 17 miles of electrification is satisfying the management or is being imposed upon it. The railroad may well desire to spread reconstruction over a term of years, but our legislators as ever will rush boldly in where railroad men still fear to tread.

In the five-year period ending Dec. 31, 1917, there was a total casualty list on American railroads of 980,565. Of this number 48,801 were deaths and 931,764 were injuries. During this period, 1391 passengers and persons carried under contract were killed and 55,887 injured; 14,652 employees were killed and 815,897 injured; 32,879 other persons were killed and 60,080 injured.

Who Says the Miner Can't Ring the Bell?



DISCUSSION BY READERS

Man Power and Longwall Mining

Letter No. 1—It was with pleasure that I read the excellent article of F. A. Pocock, *Coal Age*, Aug. 22, p. 350, bearing on the peculiar advantage of longwall mining as a means of utilizing the present limited man power to the best advantage to insure the production of the largest possible output of coal.

At the outset, Mr. Pocock announces that his remarks do not apply to the anthracite region but are particularly applicable to the entire bituminous field of Pennsylvania. He asks two pertinent questions: "Is there no way of increasing the tonnage per worker? Can the thinker not make the worker more productive?" Let me answer both of these questions in the affirmative, basing my conclusion on the conviction that the adoption of the longwall method of mining where the conditions will permit is the solution to this problem.

In the present crisis, the country must have coal and it must have soldiers, which makes it necessary that the tonnage per man be increased. With Mr. Pocock, I believe that the key to this situation is the longwall method of mining. As proof of the correctness of this conclusion, let me cite an instance of its practical application, recently, in my own experience.

The Virgin Run mine of the Coke City Coal Co. is situated on the Pittsburgh & Lake Erie R.R., about 4 miles

rooms and they worked hard, almost burning out the coal with the excessive charges of powder they were compelled to use in blasting. In the start of the work, I saw clearly the impossibility of the undertaking and proposed to the management to put the mine on a paying basis if permitted to open out on the longwall system of mining.

For some time the company refused to consider my proposition, but it finally gave reluctant consent to my trying what seemed to the officials to be a doubtful method. The attempt was permitted to be made in a corner of the hill, to the right of the present opening.

STARTING THE LONGWALL WORK

As shown in Fig. 1, I at once started a 14-ft. entry at the mouth of the old air-course, driving it on an angle of about 30 deg. to the right of the latter. As luck would have it, the conditions here were particularly favorable to my plan. The pitch of the seam was such that the gateways turned to the left of the new entry afforded an easy grade for handling the loaded cars using a mule to haul the cars.

Desiring to make all speed possible, when the new entry was driven about 40 yd. I opened up a longwall face in the usual manner. Two men were put on night shift and kept busy taking down rock and building packwalls on the gateroads.

My longwall experience, in Derbyshire, Nottingham and Yorkshire, England, convinced me that *coal digging* was not *coal getting*. Someone had taught the miners how to *get* coal by longwall, in the mines of those counties, and I reasoned that it was possible to teach men to do the same here. My first efforts were to bring the miner to understand that the overburden of the seam is utilized to break the coal in longwall, instead of using powder, as in room-and-pillar work.

OVERCOMING THE PREJUDICE OF THE MINERS

A few minutes' talk with a good miner convinced him of the comparative ease promised by the new method. I explained how it was necessary to cut two tight ends when driving a room or entry, and the man was quick to see that in longwall work, the coal was slabbed and that, when mined, no powder was needed but the roof pressure broke down the coal ready for loading. After that the miners were not slow to see that things were coming their way, and it was difficult to keep them on the old work where a miner would average about three cars a day as compared with eight and twelve cars a day in the longwall section.

About this time, however, I experienced my first difficulty in the longwall proposition. As the men were transferred from the old to the new work, trouble arose from attempting to put the one Slav to work with an Italian miner. I was forced to tell the Slav that he must bring a buddy the next day or work with Tony for whom he had no liking. The big wages the Slav was

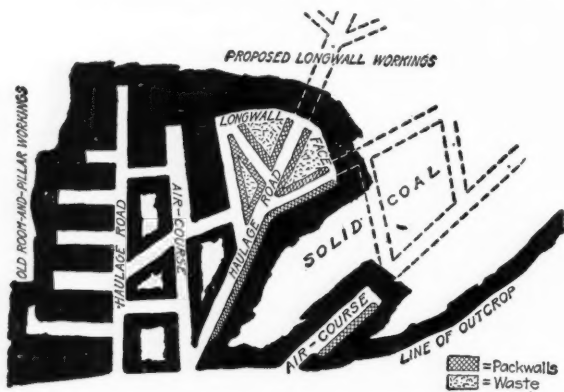


FIG. 1. ROOM-AND-PILLAR WORKINGS ABANDONED FOR LONGWALL

below Dawson, Penn. As shown in the accompanying illustration, Fig. 1, this mine was originally worked on the room-and-pillar system, there being five rooms driven off a single pair of entries. The average thickness of the coal was 44 in., which was improving slightly as the entries advanced under the hill. These entries and rooms had been driven about 10 years ago. On taking possession of the mine, recently, the new company cleaned up the falls and laid tracks to the faces of the entries and rooms, which work was completed May 20, 1918, when the company was ready to ship coal.

The mine proved a tough proposition, operated on this plan. Four or five miners were employed in the

making however, made it easy for him to secure a buddy whom he liked.

The rapid progress of the work, under the new plan, soon showed that the equipment of mules and cars was not sufficient. It was impossible to satisfy the men, as I could not give them the cars they could load. The longwall face had been extended so that there was now room to work eight men, and more animals were needed to haul the coal. Trouble again arose when Tony had to work with three Slavs on the same face. The result was that the first day Tony had one of the Slavs by the neck, disputing his right to one empty car, while on that face 20 carloads of coal were down and ready to load.

Taking out all the coal as the face advanced suggested to some the possibility of a general cave, but most of the men had full confidence in the new plan.

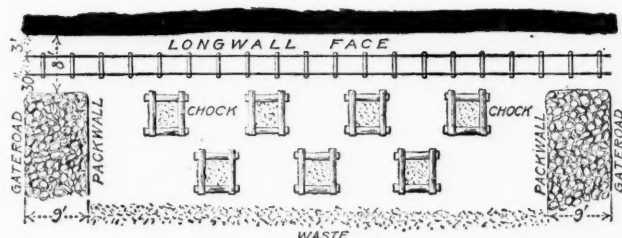


FIG. 2. TIMBERING A LONGWALL FACE WITH CHOCKS

As quickly as the face advanced, as shown in Fig. 2, chocks were built for the support of the roof over the face track, which was moved forward from time to time. On the gateroads 2½ ft. of rock was taken down for building the packwalls shown in the figure. This gave good headroom on the road and it was no longer necessary to take rock to the surface. The packwalls were 8 or 9 ft. in thickness and well built.

Owing to the longer working face, it is clear that there were less roads to keep up, while the extra expense of building the packs never approached the expenditure for timbering and trackwork, in the old system. It will generally be found a good plan to build a chock filled with rock every 40 or 50 ft. in the road-packs. This will provide for a more permanent roadway when the roof has finally settled on the pack.

In closing, let me say that the success of this operation shows that it is possible to make good longwall miners of men who have been trained for room-and-pillar work. It will pay operators who are skeptical, in regard to the adaptation of the longwall method of mining to their conditions, to investigate this system and, if necessary, make a trip to those sections of England where the method is largely used.

Connellsville, Penn.

JOSEPH A. GREAVES.

Ventilating a Gassy Slope Mine

Letter No. 4—Referring to the request of "Mine Foreman," *Coal Age*, July 25, p. 191, asking for information in regard to the best method of ventilating a slope mine, when the seam has a dip of 6 per cent. and generates much gas, let me say, sufficient data are not given to enable one to handle this subject except in a general way. To be able to discuss this matter intelligently it would be necessary to know the size and

shape of the field and extent of the mine to be ventilated, also the source of the gas, whether in the roof or the coal; also the capacity of the mine or the expected daily tonnage.

However, assuming that the field is large and of a shape that would permit, I would drive not less than four main slopes abreast, or five if the field was large enough to make that number necessary to comply with the law. These must be driven on the full dip of the seam. If only three slopes are driven, as suggested, and two of these are used as returns there will be no travelingway, unless the men traveled to and from their work on the haulage road or the return air-course, neither of which would be advisable.

MAKING AMPLE PROVISION FOR VENTILATION

A single main intake would not give enough air to ventilate such a mine, especially when you consider that the inlet would be blocked by trips a part of the time. Furthermore, if the mine became very extensive it would be impossible to circulate the required amount of air, under 1 to 2 in. of water gage, and using a single intake.

The fan should be large enough to furnish the required circulation of air, under a water gage not greater than 2 in. and, to accomplish this, it will be necessary to make the conditions in the mine conform to that requirement. It must be remembered that it is practically impossible to make a given fan give the same air with a less gage, or more air with the same gage, as the resistance of the mine determines the water gage for a given volume of air.

In planning a mine of a certain tonnage capacity, the necessary circulation must be estimated to comply with the law regarding the number of men employed and the gaseous condition of the seam. The volume of air so determined should be circulated under a water gage of, say 2 in., which fixes the size and power of fan required. The circulation in the mine must then be arranged, by splitting the current, so as to pass the required air under this gage.

INSTALL DUPLICATE EXHAUST FANS

This mine should be ventilated on the exhaust system and all haulage roads and travelingways arranged on the intake air-courses. The fan should be so constructed that it can be operated by either one of duplicate engines, in case of needed repairs or in an emergency. The fans should be of sufficient size to yield a fifty per cent. increase, if necessary.

If four main slopes are driven, the two center entries should be used as intakes, haulage roads and travelingways, and the two side entries as return air-courses. Levels or flat headings should be turned to the right and left of the main slopes, and driven three abreast, the two upper levels to be intakes and the lower one the return. Butt- or room-headings should be turned off the flat entries and rooms opened off these butts.

The air should be split at the bottom of each pair of butt-headings and, after ventilating these entries and rooms, it should be carried down the parallel entry and across two overcasts into the return. This system will require a split for each pair of room-headings and no doors will be necessary. If the mine is not making too

much gas it may be possible to ventilate two or more sets of room-headings with one split of air and, in that case, air-lock doors should be used at the mouth of each pair of entries, except the one where the air was first split, after which it could be carried by the overcasts into the return.

The question may be asked, why not make the two lower entries intakes and the upper entry the return, if each pair of entries is made a split, as that would save building the extra overcast at the bottom of each pair of room-headings. This is done so that when they start to draw ribs and stumps in the cross headings they can cut through into the return air-course, on the flat above, and drain the gas from the gobs directly into the return, forming what is known as drains or "bleeders."

ADVANTAGE OF DRIVING LEVELS FOUR ABREAST

If the cost of driving entries is not too great, four flat headings can be driven, the two center ones to be used as intakes and the two outside entries as returns. This would only require one overcast for each pair of cross-headings. Using the two center slopes as intakes permits the laying of tracks in the extra entry, for use as sidetracks or "run-arounds" and make a good haulage system and needs no doors. Where the air is split on the main slope overcasts will be required to carry the return from the lower sections of the mine across the roads going into the flats.

This mine should be worked with approved safety lamps or electric cap lamps, in conjunction with safety lamps. Permissible powder should be used and competent shotfirers employed to charge and fire all holes.

Some attention should be given to the grades at which the headings are driven. The main slopes can be driven on the full dip of the seam. The levels or flat headings should be driven with about a 2 per cent. grade in favor of the loads. The room-headings are driven on an up-grade of about 3 per cent. in favor of the loads. Rooms turned off the room-headings are driven about on the same grade as the flats.

RICHARD MAIZE, Mine Inspector,
Uniontown, Penn. Fifth Bituminous District.

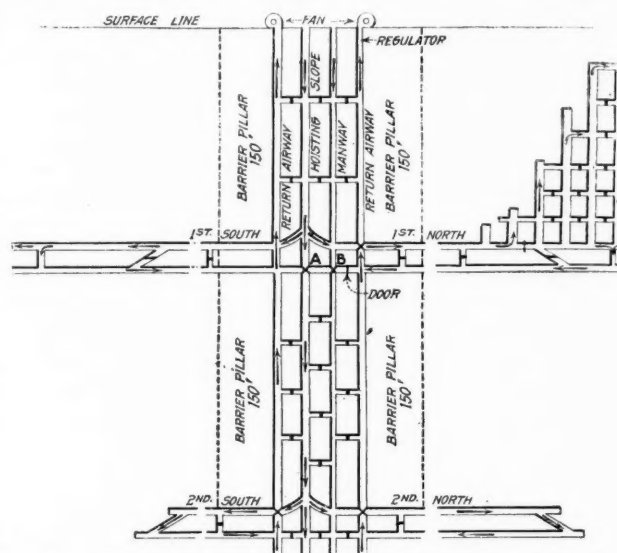
Letter No. 5—I have followed the discussion in regard to the best method of ventilating a slope mine generating large quantities of explosive gas, with much interest, and desire to submit the following, which appeals to me as being best adapted to the conditions outlined in the inquiry that appeared in *Coal Age*, July 25, p. 191:

As the efficiency of any ventilating system depends, to a great extent, upon the method adopted in the development of the mine, I have prepared the plan shown in the accompanying figure. My opinion is that a slope mine, opened in a seam generating large quantities of gas, should not have less than four parallel slopes sunk on the full dip of the seam.

As indicated in the figure, the exhaust system of ventilation should be adopted. In this arrangement, the main hoisting slope and the manway, being the two central slopes, are intake airways, while the two side slopes are the return airways for their respective sides of the mine. Since the men are warm when coming out of the mine, the air in passing down that slope must be controlled by a regulator so as to reduce the draft to which they are exposed.

The hoisting slope is $7\frac{1}{2} \times 14$ ft. in the clear and the manway 7×7 ft. in the clear, while the two air-courses should each have a sectional area not less than 64 sq.ft. If desired, steps can be provided in the manway by running poles 6 in. in diameter across the slope and hitching them into the rib or supporting them behind the legs of the timber sets. On this inclination, however, that may not be thought to be necessary.

Two fans are shown in the figure, one located at the mouth of each return airway. These should be reversible so that the air current can be reversed, if that is



PROPOSED ROOM-AND-PILLAR RETREATING SYSTEM

necessary. I would install one fan only the first year, and let the other wait until the development of the workings required an independent circulation for each side of the mine. I consider this a very necessary precaution to take in a mine subject to large inflows of explosive gas.

Each fan should have a capacity sufficient for the ventilation of the entire mine. In order to accomplish this, however, overcasts must be built at A and B, while the door shown in the crosscut divides the circulation and when closed makes each fan independent of the other. As a further precautionary measure, these fans should be provided with two independent sources of power, steam and electricity, so as to guarantee their continuous operation.

Further explanation of the plan shown in the figure is unnecessary, except to say that if the requirements of the company will permit, I would adopt the room-and-pillar retreating system, driving the levels to the boundary before turning any rooms. This plan will greatly simplify the ventilation by allowing large quantities of gas to be drained off before attempting any extraction of coal in the rooms.

It should be observed that the crosscuts are shown on this plan as far apart as possible, which will give stronger pillars on both the slopes and the entries, besides decreasing the number of stopings required, which are always a source of leakage of air. By employing a booster fan and using flexoid tubing 16 in. in diameter where the room will permit, the distance in crosscut yardage will soon pay for this equipment.

Cassidy, B. C., Canada.

J. W. POWELL.

Loading Coal at the Face

Letter No. 4—I read with much interest the letter of Thomas Hogarth, *Coal Age*, Aug. 8, p. 282, referring to the record made in the loading of coal by Ed. Blagg at No. 1 mine of the Buckeye Coal and Railway Co., San Toy, Ohio. As stated by Mr. Hogarth, Mr. Blagg is reported to have loaded 508 tons of coal in 22 working days of 8 hr. each, in the month of May.

Like many others, I was tempted to doubt the report. Having worked at the same mine, in the year 1906, I know what a person has to contend with in that mine, in loading such a tonnage as that stated. The seam of coal averages about 3 ft. 8 in. in thickness and is overlaid with from 6 to 8 in. of bone coal.

In entry work the bone coal is taken down with every cut taken out, and it requires one large car to remove that bone from the entry. Judging from my own experience, Brother Blagg would have to load two cars of bone to every 20 cars of coal, making a total of 22 cars loaded each day he worked at the face. As just stated, I had a suspicion that something was wrong and wrote Brother Blagg for first-hand information, and Sam Walters, to whom Brother Blagg referred my letter, sent me the following official statement, which he vouches is correct:

AUTHORIZED STATEMENT OF TIME WORKED AND TONNAGE OF COAL LOADED BY EDWARD BLAGG, DURING THE MONTH OF MAY, 1918

Date	Hours Worked	Tonnage	Date	Hours Worked	Tonnage
1	8	20	16	7	17
2	8	18	17	8	23
3	8	22	18	6	14
4	8	25	20	8	20
6	8	27	21	8	27
7	8	21	22	8	16
8	8	23	23	8	21
9	5	10	24	8	26
10	8	31	25	4	3
11	4	7	27	8	22
13	8	23	28	8	24
14	8	12	29	8	19
15	8	19	31	8	18

This coal was loaded on bank time only. The 7 tons loaded May 11, and the 3 tons, May 25, was all the coal down those days.

The statement shows the number of hours worked each day and the tons of coal mined. It shows that, instead of this output (508 tons) being the work of 22 days, as reported, the exact time worked was 24 days and 2 hours, mine time.

Notwithstanding the error of 2 days, and 2 hours made in the first report, we must admit, as mining men, that Brother Blagg accomplished a great feat, considering the disadvantages existing in that seam in getting the coal ready to load. To my knowledge no person in this part of the country has ever before made such a record, and I want to say that if we had an army of coal loaders such as Ed. Blagg, we would not suffer for a lack of fuel next winter.

JAMES H. TAYLOR.

Poston, Ohio.

Travel of Electric Current

Letter No. 5—In reading the discussion of this subject, in *Coal Age*, I could not fail to observe the different aspects in which the several writers viewed the situation presented in the flow of electricity in a conductor. In this, as in most other controversies, it is probable that both sides are partially correct in their contention. What we are pleased to call the "electric current" may be the actual flow of something in a conductor, while, at the same time, there is something going on outside of

or surrounding the body of the conductor and which is incidental to the current.

The flow in the conductor, when the current is direct or continuous, is probably uniformly distributed throughout its entire cross-section. In other words, when such a current is flowing extremely minute particles of negative electricity called "electrons" move along longitudinal lines through every section of the conductor. On this assumption, an electric current has been defined as "a flow or movement of electrons."

Now, consider what happens at the same time outside the conductor. When the so-called current is flowing through a conductor, a magnetic field is established about the latter. Seemingly, then, the whole discussion hinges on our definition of an *electric current*. Do we understand this term to refer primarily to the flow that takes place within the conductor, or to the external magnetic field incident to and associated with the former?

Reference to electrical authorities reveals no general agreement as to the meaning of the term. Until this morning, I have never had occasion to compare the different definitions given by many books on the subject. I find that no two of them appear to be the same, which, to say the least, is confusing to one in search of exact information.

Personally, I prefer to define an electric current as the flow of electricity through or within the conductor, meaning by that the movement of electrons within the body of the same. I like to regard the effect outside of the conductor as a distinct phenomenon and incident to the current in the wire.

THE ELECTRON THEORY HELPFUL

Probably, the actual situation can be most readily understood by adopting the electron theory. In my book, "Practical Electricity," I have endeavored to set forth this viewpoint in an elementary way. My belief is that when one adopts the electron theory and becomes familiar with its essential elements, which practical men may grasp with little effort, many things concerning electricity that were previously regarded in a vague and hazy manner become clear.

Allow me to urge that every electrical man, the practical man in particular, familiarize himself with the fundamental conception of the electron theory. From experience, I know that this will be of great value to his understanding of the subject.

Following are some of the definitions that I found in my search for the true meaning of the word "electric current":

CURRENT, ELECTRIC—A continuous flow of electricity along a conductor; also the rate of flow of the electric fluid through a conductor, representing the ratio between the electromotive force and the resistance.

CURRENT, ELECTRIC—A continuous flow of electricity a conductor, from the higher to the lower of two points having different potentials.

An electric current is defined as the rate of flow of electricity, or the quantity of electricity which flows through a cross-section of the circuit, per unit of time.

The quantity of electricity, per second, which passes through any conductor or circuit when the flow is uniform

It is my hope that the American Institute of Electrical Engineers, or some other qualified authority, will soon define for us the meaning of this term in a manner that will give to it a definite significance.

St. Louis, Mo.

TERRELL CROFT.

INQUIRIES OF GENERAL INTEREST

Blackdamp on Pitches

Working at the face of a 35-deg. pitch, in a mine operated in the Buck-Mountain seam, I have experienced some difficulty in the ventilation of my place. What I have taken to be blackdamp appears to hang at the face of this pitch. The gas dims the light and, in other respects, suggests that it is blackdamp.

As is well known, however, the ordinary blackdamp is much heavier than air and accumulates at the face of dip workings and other low places in a mine. It is not natural to find it at the face of a pitch, and I want to ask, Is it possible for blackdamp to hang at the face of a chute pitching 35 deg.?

MINER.

Shamokin, Penn.

Before answering these questions, it will be well to understand what is meant by the term "blackdamp," which miners generally think is carbon dioxide (CO_2).

Originally, the term "damp" was used to describe mine gas, as distinguished from pure air. The meaning of the term was a vapor or fume. Later, as miners came to distinguish between gases having different properties, they applied the terms "firedamp," "blackdamp" or "chokedamp," "whitedamp," "afterdamp," "stinkdamp," etc., according to the particular characteristic or nature of the gas observed.

Thus, the true significance of the term "blackdamp" is a gas or mixture of gases that dims or extinguishes the miner's light, leaving him in the dark. The term does not apply to carbon dioxide any more than to nitrogen, but describes an atmosphere deficient in oxygen, which is required for the support of life and combustion.

In a chart issued a short time ago by the Federal Bureau of Mines, the average composition of blackdamp is given as 11 per cent. carbon dioxide and 89 per cent. nitrogen. In the opinion of *Coal Age*, however, it is not possible to give an invariable or absolute composition of blackdamp. It is, on the contrary, a variable mixture of extinctive gases, in this respect resembling afterdamp. The term cannot be applied to carbon dioxide unmixed with air or other gases. That is to say, blackdamp and carbon dioxide are not synonymous terms. Likewise, the term "firedamp" cannot be applied to methane or marsh gas unmixed with air. It is a question, also, whether the term "whitedamp" is synonymous with carbon monoxide, as that gas does not represent the mixture the term described in its original meaning.

Returning now to the question asked by our correspondent: What he has very properly called "blackdamp," owing to the extinctive quality of the observed gaseous mixture encountered at the face of the pitch, is not carbon dioxide as he may wrongly assume. It is a true blackdamp mixture, having a specific gravity but slightly greater than that of air. Because of its temperature being somewhat higher than that of the

air on the gangway, such a mixture will tend to hang at the face of the pitch.

Taking for example, the average composition of blackdamp as given by the Bureau of Mines, in the chart just mentioned, namely, 11 per cent. carbon dioxide and 89 per cent. nitrogen, since the specific gravity of these gases is, carbon dioxide 1.529 and nitrogen 0.9713, the specific gravity of the assumed mixture would be

Carbon dioxide,	11	\times	1.529	=	16.819
Nitrogen,	89	\times	0.9713	=	86.446
	100				103.265

The specific gravity of this mixture is, therefore, $103.265 \div 100 = 1.032$, showing that the assumed mixture is slightly heavier than the same volume of air, at the same temperature.

It should be mentioned, here, that such an atmosphere as the one just described cannot be assumed to exist in a mine. It is probable that the air at the head of the pitch referred to by the correspondent approaches a *residual* atmosphere, in which a portion of the oxygen has been consumed by the breathing of the men and the burning of the lamps, and there has been produced, besides, a certain amount of carbon dioxide.

Under these conditions, a residual atmosphere becomes extinctive of a lamp flame when it contains about 3 per cent. of carbon dioxide. The composition of the air, at that stage, is as follows: Oxygen, 16.6 per cent.; nitrogen, 80.4 per cent.; carbon dioxide, 3 per cent. The specific gravity of these gases being: Oxygen, 1.1056; nitrogen, 0.9713; carbon dioxide, 1.529; the specific gravity of the mixture forming a residual atmosphere is calculated as follows:

Oxygen,	16.6	\times	1.1056	=	18.353
Nitrogen,	80.4	\times	0.9713	=	78.092
Carbon dioxide,	3.00	\times	1.529	=	4.587
	100.0				101.032

The specific gravity of this mixture is, therefore, $101.032 \div 100 = 1.01$, which shows that such an atmosphere is slightly heavier than the same volume of air, at the same temperature. To make the density of this mixture equal to that of air, assuming the temperature of the air on the gangway is 60 deg. F., would require a rise of only 5 deg., which probably represents more or less closely the actual condition in this case. Assuming a somewhat slack ventilation of the place, this difference in temperature would easily be attained, owing to the burning of the lamps and breathing of the men working in the place, together with the heat radiated from their bodies.

It is possible, also, that there is an inflow of carbon dioxide into the chamber, either from the coal or from adjoining workings further up the pitch, or from an overlying seam, in which case, the conditions at the head of the pitch would be aggravated. We shall be glad to have this question further discussed by readers.

EXAMINATION QUESTIONS

Kansas Firebosses' Examination Pittsburg, May 15, 1918

(Selected Questions)

Ques.—What are the lawful duties of a fireboss?

Ans.—The rules governing the operation of coal mines in the State of Kansas, as they relate to the duties of the fireboss, require him, before going into the mine to first clean and examine his safety lamp and then examine the fan and fanhouse to see that no unusual conditions exist. He must never take an open light into the mine, but must be provided with an electric light when the light given by his safety lamp is insufficient.

He must observe and see that the air is traveling uniformly in its usual course; examine all doors and curtains to make sure that they are in good condition and not leaking, which would allow gas to accumulate in the workings. Where gas in dangerous quantity is found, the fireboss must place a danger signal and permit no one to enter or work in such places, until they are cleared of gas and safe for work. He must permit no one to work on the return air where he has discovered a gas feeder.

Ques.—If, upon making an examination of a mine, you discovered explosive gas in the intake air current of one of the splits in which 45 persons are employed, how would you proceed to protect the workmen?

Ans.—Notify the men at once to extinguish their lamps, proceeding in order from place to place and instructing everyone to withdraw as quickly and as quietly as possible from the mine. This is assuming that the test mentioned showed a dangerous percentage of gas present in the air current.

The percentage of gas that can be considered dangerous will depend very largely on the conditions existing in the mine, in respect to the inflammability of the coal and the amount of dust suspended in the air. If the condition is such as not to be considered dangerous for work, the men should be instructed to use extra precaution in their places; and, at the same time, every effort should be made to increase the circulation of air in that split, so as to reduce the explosive condition of the current. A careful watch must then be kept and frequent tests made to ascertain what changes are taking place and to enable due warning to be given the men in case of danger.

Ques.—After making your examination of the mine, what evidence would there be to show that you had examined all the working places? When and where would you make your reports and what information would the reports give?

Ans.—The fireboss is required to mark the date on the face of every working place examined and found to be safe for work. Where gas is discovered in a place, he is required to fence off all the entrances to the place, placing at each entrance a suitable danger

signal, which is warning to all men to keep out. The fireboss' report, when properly made out, is also evidence of what places he has examined.

Immediately on completing the examination of the section of mine in his charge, a fireboss must proceed to the shaft or slope bottom or the mouth of the mine and make out and sign a written report, in a book kept for that purpose. This may be done in the fireboss' shanty near the entrance of the mine or in the office outside. The report must show the time of beginning and completing the examination, and the places examined, giving in detail any dangers that may have been found, stating their nature and where they exist.

Ques.—How would you proceed, with safety, to enter a mine, after an explosion that has destroyed the doors, brattices and overcasts?

Ans.—An examination must first be made to ascertain the condition of the ventilating apparatus and to observe the upcast current discharged from the mine. Everything will depend on the results of that examination, as no attempt must be made to enter the mine except on the intake air. Having organized a rescue party composed of experienced miners, under a competent leader, and equipped with safety lamps and breathing apparatus, which should always be available at every mine, and having gotten together the necessary supplies of tools and material required to rebuild brattices and restore the circulation in the passageways, entrance must be made by following the intake air. No advance must be made ahead of the air, which must be carried forward by constructing temporary brattices. It is necessary to proceed with caution, making frequent tests of the air with the safety lamp and by observing the caged birds or mice that must always be carried by rescuers to insure their safety.

Ques.—How would you proceed to extinguish a mine fire at different stages of the fire?

Ans.—A gob fire, caused by spontaneous combustion occurring in the waste, can generally be loaded out of the mine if taken in time. When a feeder has been ignited and is burning back under the gob the flame can sometimes be extinguished by exploding a small stick of dynamite near the place. It is not well to treat a gob fire with water ordinarily, as the moisture tends to increase the heating of the gob and extend the trouble.

A fire that has gained considerable headway by the ignition of a door, brattice, timber frame or a gas feeder in the coal must be extinguished with water or by the use of fire extinguishing apparatus. When this cannot be done, the place must be sealed off so as to prevent air reaching the fire, which should then die out for lack of oxygen to support the combustion.

When every other means has failed recourse must be had to drowning out the fire, by flooding the place where it is located. For this purpose, it is sometimes possible to build a substantial dam in the opening leading to that section and thus avoid flooding the entire mine.

COAL AND COKE NEWS

What Happened in August

[The bracketed figures in the text refer to pages in the present volume and should the reader desire further information he can obtain it by reference to the pages indicated.]

- Aug. 1—Canadian railroads file new rates approximately 20 per cent. higher than those in force—Mines of the Lehigh Valley Coal Co. at Beaver Meadow are flooded by the rising of Sulphur Creek and the bursting of the Beaver Meadow silt dam [289]—Lehigh Valley Coal Co. restricts its operations [289]—An Austrian, Alexander Frank, by name, is accused of attempting to blow up Wilson Creek mine near Carbondale, Penn. [366]—Increase in wage granted in Alberta coal mines to balance increase in cost of living [497, 457].
- Aug. 2—Order establishing production committees at all local mines—Fuel Administration provides price for "sized screenings" to take the place of anthracite and to be used in magazine or base-burner stoves—Order No. 670 issued by Fuel Administration restricting the movement of anthracite coal from any of the coal docks in the States of Minnesota, Wisconsin and Illinois, and in the upper peninsula of Michigan—Conference of mine operators at Washington, D. C., relative to increased production.
- Aug. 3—Price is set for the "modified mine-run" product of mines in Barton and Vernon Counties, Missouri, and in Cherokee and Crawford Counties, Kansas—Announcement is made that retail coal dealers in Minnesota and South Dakota have refunded \$16,000 to their local customers, or where these could not be located to the Red Cross—During the week just ended anthracite production rose to a record figure, 1,750,490 tons.
- Aug. 5—United States Fuel Administrator condemns the coal operators for "bidding against each other by payment of bonuses," threatens where bonuses are paid to assume that the coal price allowed is too high and declares that he will order a lower price in such cases—Weekly reports are required to be made to the Fuel Administration relative to domestic coke production and distribution—Delegates from 52 unions in northern anthracite field meet and demand a 25 per cent. increase in wages, time and a half for overtime and double time for Sundays without increase in selling price of coal [322].
- Aug. 8—Fuel Administration orders that cement plants shall consume in the calendar year 1918 only 75 per cent. of the average annual fuel consumption between Jan. 1, 1915, and Dec. 31, 1917—Two plants may combine and pool the coal allowed and larger allowances may be given if market conditions render it necessary—Wood and peat may be used ad libitum if not brought in by railroad.
- Aug. 9—President Wilson addresses a proclamation to all those engaged in coal mining, urging steady work and the duty of miners to claim and accept exemption under the selective service draft [319]—All bars are withdrawn restricting the importation of Mexicans for work at coal mines [378].
- Aug. 12—New railroad rates become effective in Canada.
- Aug. 15—James B. Neale announces that 28 production managers have been appointed [363].
- Aug. 16—President Hayes, of the United Mine Workers of America, states that "the only logical solution of labor conditions in the mining industry" is a substantial flat wage increase to be applied to all classifications of labor [365]—Fuel Administration orders that bona-fide contracts relative to charcoal made prior to order of July 8, 1918, shall stand. This order was privately promulgated.
- Aug. 13—Dominion Coal Co. announces bonus to shippers and loaders [456].
- Aug. 17—Fuel Administration makes order adjusting charges for handling and forwarding lake cargo coal and fuel for lake vessels [364]—Fuel Administration pro-

vides that the price of coal delivered into the tenders of engines may be 5c. per ton more than that charged for coal loaded in cars for shipment [364].

- Aug. 21—Yorkshire (England) mine workers, threatening to strike against Judge Benson's award, receive letter from Marshal Foch—"Coal is the key to victory. The miners of Great Britain must help me."—United States Fuel Administration limits the amount of coal that may be stored by industrial plants [405].
- Aug. 22—Yorkshire coal strike begins and comes to an end, the employees receiving concessions [420]—Meeting of district presidents of United Mine Workers to discuss wage increase urged by President Hayes Aug. 16 [365]—Interstate Commerce Commission decides that no additional charge shall be made for freight carried in privately owned cars except where the ordinary rate is based on the cost of transportation of like freight in a type of car that is more readily and cheaply handled. Increase does not apply to stock, coal, coke, rack, flat, box or pocket cars, the additional rate on which remains 3c. a mile.

Aug. 23—Cardinal Gibbons writes a letter to Dr. H. A. Garfield urging greater coal production and stating that the clergy can and will render great assistance by urging the duty of steady work upon their parishioners [541]—An order is promulgated by the Fuel Administration removing, except as to breweries, till Sept. 8 the restrictions on the purchase and use of slack and screenings west of the Mississippi River—[319, 363]. Fuel Administration promulgates a new classification of Alabama coals and specifies new prices for same [406]—Fuel Administration creates a new district in Ohio, No. 9, a subdivision of District No. 5. It includes the Cambridge and Hocking fields. The Fuel Administrator also reduces the prices of all Ohio coals except District No. 8, where adjustment has already been made.

Aug. 24—Fuel Administration announces the beginning of the erection of a "Carbo-coal plant near the junction of the Carolina, Clinchfield & Ohio and the Norfolk & Western railways.

Aug. 25—Strike of men of Nova Scotia Steel and Coal Co. to compel four men to retain union membership on their advancement to official position [456, 457].

Aug. 29—Fuel Administration announces that the lamp manufacturers have agreed to eliminate the carbon filament lamp in favor of the tungsten lamp though battleships and industrial establishments where vibration is excessive will probably continue to use them. It is hoped that a million tons of coal will be saved by the use of the more economical lamp.

Aug. 31—Fuel Administration announces that by Sept. 15 it hopes to be able to put in operation a skip-stop provision for street cars which will save 1,500,000 tons of coal a year—War Industries Board orders West Penn Power Co. in Pittsburgh district, to give coal mines a full supply of power discriminating in favor of coal companies as against all other industries [453].

Harrisburg, Penn.

At a meeting of the executive committee of the Pittsburgh Coal Producers' Association on Sept. 4, plans were completed for a vigorous fourth Liberty Loan campaign among the miners of the Pittsburgh district. Philip Murray, president of District No. 5 of the United Mine Workers of America, attended the meeting by request, and will take a prominent part in the campaign.

A meeting of the miners and operators was also held, at which a committee to have charge of the campaign was appointed. This committee consists of three operators and three miners, and will have power to appoint sub-committees of three miners each, which will be stationed at all of the 300 mines in the district, to be known as the Liberty Loan committees, whose duties will be to take subscriptions for the loan. These committees will be entirely independent of the production

committee appointed to speed up coal production at the mines.

Richard W. Gardiner, manager and distributor of coal production in the Pittsburgh district, stated on Sept. 6 that complaints have been received by him that certain industrial plants of the district are making a practice of distributing part of the coal assigned to them among their employees. Mr. Gardiner, in a statement issued, says that this is contrary to the orders of the Federal Fuel Administration and that he will unhesitatingly shut off the supply of any plant practicing such distribution of its coal, no matter how small the distribution may be.

Connellsville district, America's premier coke region, smashed all its coal production records for the week ending Sept. 7, according to a report made from Uniontown by W. L. Byers, production manager, to James B. Neale, Director of Production of the Federal Administration. Tonnage for the week was 718,221, an increase of 2424 tons over the preceding week and 1267 tons more than the previous high week of the current coal year.

This record is not only remarkable in itself, but is doubly so when it is considered that it is for the six-day period which included Labor Day. As it stands, it is regarded as a practical demonstration of patriotism on the part of all men engaged in the coal industry of that district. Since Connellsville coal is a great source of coke supply, the record-breaking output is a direct contribution to the nation's blast furnaces which are supplying the metal going into the guns and shells which America is shipping abroad.

Uniontown, Penn.

That a coal company is liable under the compensation law for death or injury received by policemen in its employ is the import of an award made by the State Compensation Board, allowing Mrs. Louis Vecchio compensation in the sum of \$7000 for herself and nine children. Vecchio was employed as watchman for the Husted Semans Coal and Coke Co., and was killed by Andy Medavich, another watchman, in a quarrel over their authority. Medavich is now serving a term in prison for second degree murder.

Monthly shipments of coal and coke down the Monongahela River to Pittsburgh continue to break all records. The aggregate shipments during the month of August passing through Lock No. 4 at Charleroi was 29,282,350 bushels, of which 28,563,000 bushels was coal and 719,350 bushels coke. The increase over the July shipments was 1,530,800 bushels. A decrease in coke shipments was brought about by an increased coal traffic to the Clairton by-product plants. Because of the necessity of keeping that plant supplied with coal it was necessary to shift several steamers from the coke to the coal trade.

West Virginia

The last few weeks have witnessed a marked change in production conditions throughout West Virginia, due solely to an improvement in the car supply. During the second week in September most of the districts in the state were receiving a 100 per cent. supply. Relief was not only afforded by the railroads and a pronounced increase in production shown, but at the same time apprehension lest the mining industry be badly crippled by further draft inroads was dispelled when the district draft board for the southern district of the state issued a statement that the board proposed a more liberal construction in its classification as to "skilled" laborers. At the same time production committees were beginning to secure results from an active and well organized production campaign. Circumstances, according to operators, seem favorable to an increased production during the month of September, if the record established during the last week of August is to be accepted as an indication of what it may be possible to establish. Even the Labor Day loss of production was to some extent offset by working at night during

the days immediately preceding and immediately following that holiday.

Production of coal in the New River field has within the last few weeks been increased an average of 30,000 tons a week over the normal production during August. This increase represents a gain of 7 per cent. in the field proper and 8 per cent. in the Winding Gulf district, the last named division now producing about 105,000 tons per week. The production committees for the New River and Winding Gulf fields have been busily engaged in organizing both the fields mentioned right down to each mine and each man, with substantial results to show for such work. Car supply in both the New River and Winding Gulf Districts since the first of the month has been practically 100 per cent., or equal to all requirements of the mines, the districts in question being supplied by both the Chesapeake & Ohio and the Virginian Railways.

There has also been a most perceptible improvement in the Kanawha region insofar as transportation facilities are concerned, although the betterment of conditions in that region was not apparent until last week, when the holiday cut into production. Under favorable conditions the mines in the Kanawha district are capable of producing in the neighborhood of 230,000 tons a week as against the 168,000 tons produced according to the latest figures available.

Coal has been produced in much larger quantities during the last few weeks in the Fairmont field than was the case during August, an increased car supply making this possible. While late placing of cars has to some extent curtailed production in the Fairmont field, even when an ample number of cars are on hand, this is being overcome to a large extent and operators in the district are extremely hopeful of being able to establish a new high-water mark during the current month, though this will be dependent almost entirely upon transportation facilities afforded.

With more cars available in the Tug River and Pocahontas districts and with a more liberal construction of the selective service regulations as applied to those actually engaged in mining, the industry in the southwestern part of the state is beginning to hit its stride once again, after a period of curtailed production due to a shortage of man power. While a shortage of cars has not affected production to as great an extent in the districts referred to as it has elsewhere, nevertheless it has even been felt in those districts, but in the last few days an improvement is even observable in the Pocahontas and Tug River districts.

Reverting to conditions in the Fairmont district, the operators in that region, while making no complaint as to the Monday supply of cars in that district, are not satisfied as to the supply which has been vouchsafed them and which is now being given them during the remainder of the week, and while the supply as already indicated is not as bad as it has been within the past month the number of cars furnished is far from adequate.

On the other hand, mines reached by the Western Maryland Ry. have fared exceedingly well during the last few weeks in point of cars supplied them. Such mines are located in Randolph and adjacent counties.

Elkins, W. Va.

A mass meeting of coal operators from Randolph, Barbour, Upshur and surrounding counties was held at the Y. M. C. A. Auditorium at Elkins, Tuesday afternoon, Sept. 12. The meeting was called by C. H. Jenkins, president of the Northern West Virginia Coal Operators' Association, while the directors of the state association were meeting last week at Huntington. The chief feature was an address by Mr. Fleming, who was recently named production manager for the Fairmont district. Mr. Barrett, of the Department of Labor, made a few remarks to operators outlining the work planned by that department.

Mr. Bradley told how the state coal association could be of value both to the country generally in war times and to operators as individuals. He dwelt particularly on the importance of physicians remaining at the mines and not heeding the call for service overseas, pointing out that miners would not remain at the mines if there were no physicians and that such action would mean a serious loss of production.

Mr. Fleming emphasized the necessity of increased production, and urged the operators to name production committees at their mines if that had not already been done. He discussed the necessity of putting it before the mine workers squarely

that they were essential to to production of coal and therefore more needed at their present posts than in the trenches. He told of finding draft boards ready to grant exemption to mine workers really essential to production and pointed out that men taken heretofore might possibly be furloughed and brought back to the mines if still in this country. He emphasized the necessity of following out prescribed regulations where mine workers were willing to accept deferred classifications. Pressure must be brought on the mine worker to make such an affidavit, the foreman or superintendent must back this up with an affidavit that he is essential, and the operator must file still another affidavit.

Birmingham, Ala.

Coal production in Alabama during the week ended Aug. 31, totaled only 390,413 tons, as compared with 430,311 tons produced during the preceding week. The slump in production is attributed chiefly to the effects of payday, though there is some complaint also of car shortage. Col. H. E. Hutchens, district director of the railroad administration, states that practically 100 per cent. was attained during the week in furnishing freight cars for coal transportation to the miners. He declines to attribute any of the shrinkage in production to car shortage.

Another drawback in production for the week ended Aug. 31 was the loss of four days work at the Lewisburg mines, where a cloudburst did much damage, drowning four men and wrecking the main entry and flooding the mines. These mines had a daily output around 1250 to 1500 tons.

Among the interesting announcements in Birmingham coal circles during the week was the reported purchase by the Texas Steel Co. of Beaumont, Tex., of two coal beds in this district. The company, according to this announcement, expects to build coke ovens and manufacture coke to be used in some prospective steel works in Beaumont. One of the coal beds purchased by the Texas company is situated on the Warrior River, close to the Louisville & Nashville R.R., and is estimated to contain more than 2,000,000 tons of fuel. The other property is located in the same section and is known to contain a large tonnage of coal.

The coke production in Alabama and the Birmingham district for the past week is holding near maximum, though the Alabama company is expected to cool down its coke ovens at Lewisburg because of the coal shortage resulting from the mine accident there. It will require from 30 to 40 days to repair the damage to the Lewisburg mines, and this will have a material effect on the coke production of the Alabama company. Byproduct coke oven production shows a slight increase.

Victoria, B. C.

Throughout the four Western Canadian provinces the announcement of Hon. Martin Burrell, Minister of Mines, that a Lignite Utilization Board has been appointed to deal with problems concerned with the further development and use of deposits of lignite coal in this section of the Dominion, has been received with satisfaction by operators. Mr. Burrell states that the action is the result of negotiations between the Provinces of Saskatchewan and Manitoba and the Federal Government, and further asserts that his department has been for a long time engaged in an investigation of the possibilities of carbonizing and briquetting lignite coal for household use as well as for producing byproducts such as ammonia, sulphate and gas. It is explained that the Dominion Government passed an order-in-council some time ago authorizing the Minister of Mines to enter into an agreement with the governments of Manitoba and Saskatchewan providing that they would contribute \$100,000 each and the Central Government \$200,000, for the establishment of an experimental plant and for investigation and experimental work whether before or after the establishment of the said plant, as might be deemed necessary or advisable. Owing to the absence of the Prime Minister of Manitoba in England, the matter was delayed for a time, but the agreement now has been concluded and the Board appointed R. A. Ross, consulting engineer of Montreal, as its chairman. He has been an active member of the Council for Scientific and Industrial Research and has taken a keen interest in the problems under consideration. J. M. Leamy, of Winnipeg, Man., provincial electrician, and J. A. Shephard, a businessman of Moosejaw, Sask., are the other members.

Anchorage, Alaska

Consideration is being given by high officials of the Administration to the matter of expending the \$1,000,000 carried in the naval appropriation bill, for the mining of coal in the Matanuska field for the use of the navy. A press dispatch, under date of Aug. 10, from Seattle, reads as follows: "Secretary of the Interior Lane is negotiating with Secretary of the Navy Daniels, whereby the Interior Department, acting through the Bureau of Mines, may superintend the expenditure of the million-dollar appropriation, carried in the naval appropriation bill, for the mining of coal in the Matanuska coal fields for the benefit of the navy. If Daniels rejects the proposal, the navy bureau of supplies and accounts, at the head of which is Admiral McGowan, will create an organization to produce the coal."

Coal land development in the Nenana field is briefly outlined in a report by Andrew Christensen, head of the Land and Industrial Department of the Alaskan Engineering Commission, who recently made a trip of inspection to the interior country: "Two parties are developing coal prospects along the line of the Government R.R., in the northern edge of the Nenana coal field," reads Mr. Christensen's report. "One prospect is a 5-ft. bed which was uncovered by the grading contractors at Mile 28, south of Nenana. W. F. Lynn has a free-use permit, and is driving on the bed. Some of the coal was used in a pile driver of the Alaskan Engineering Commission, and proved satisfactory. If the bed continues, and is of proper quality, it is the intention of the Alaskan Engineering Commission to enter into contract with Mr. Lynn for furnishing coal when the railway reaches that point."

"Robert E. Burns and associates have uncovered five coal beds near Mile 50, south of Nenana, on the west side of the Nenana River. These beds lie at a dip of about 45 deg. and appear to be an extension of the large beds exposed on Lignite Creek. They vary from 5 to 20 ft. in thickness, and the quantity of the coal appears to be as good, if not better, than the coal exposed on Lignite Creek. Mr. Burns is driving a tunnel on the largest bed, and is preparing to furnish coal to the railroad when the rails reach it. These beds are located about half a mile above the mouth of Lignite Creek."

"Arrangements will be made to have samples from these mines shipped to the Bureau of Mines Experiment Station, in Fairbanks, and careful analyses made from time to time. It is also planned to install an experimental drier for the purpose of drying the coal so as to improve its efficiency. The principal difficulty with the coal in its raw state is that it slacks rapidly, due to the amount of moisture it contains. Experiment with this coal is being looked forward to with considerable interest, because, if it proves satisfactory, it may be unnecessary to construct a spur across the Nenana River to Lignite Creek at this time in order to secure an ample supply of coal. Coal is badly needed by the railroad, and for domestic use in the interior. Wood is selling at an exceedingly high price, and is becoming rapidly exhausted."

PENNSYLVANIA

Anthracite

Pottsville—The Philadelphia & Reading Coal and Iron Co. has completed 84 model tenements of seven rooms each, electrically lighted, at its Eagle Hill colliery. The houses have ample garden room and rent for \$7.50 per month.

Kaska—While the three years' accumulation of water is being pumped from the Kaska shaft of the Alliance Coal Co., the colliery is operating as a washery, loading the banks dumped by the former lessees, the Dodson Coal Co.

Freeland—Three miners employed at the Tomhicken colliery of the Lehigh Valley Coal Co. ran several loaded cars from the outside down the slope, wrecking the hoistway so badly that the mine was idle for nearly a week. When arrested they pleaded that the act was one of mischief and not committed with the intention of hindering production.

Bituminous

Connellsville—Prominent business men of this city did their bit on the coke yards in answer to an appeal by the fuel administration and the H. C. Frick Coke Co. A quantity of coke accumulated on the yards of the corporation's Davidson plant was much needed at the mills and could not be loaded by the workmen without cutting into the regular production. The volunteers—bankers, merchants and business

men—turned out each day for several days and went through a 12-hour shift, stopping only for meals. They were paid regular wages for loading the coke, but the majority of them indorsed their pay checks in favor of the Red Cross.

Pittsburgh—Charged with seeking to hinder coal production in the Pennsylvania fields by purchasing all available supplies of carbide, Charles W. Buck, aged 40, a German, of New York, was arrested on Sept. 6 and is being held for investigation by Federal authorities. It is alleged that Buck made attempts to organize a force of purchasing agents throughout the bituminous coal region of Pennsylvania to buy carbide.

Waynesburg—H. G. Rockwell, of Chicago, Ill., has recently purchased five tracts of coal land in Franklin Township, Greene County, aggregating more than 700 acres, at a uniform price of \$400 an acre. A tract containing 333.314 acres was purchased from Judge James Ingram, Mrs. Sarah Lindsey, Mrs. H. D. Patton, of Waynesburg, and the heirs of Elizabeth D. Hook, of Leavenworth, Kan. The consideration was \$133,325.60. Two tracts were purchased from I. H. Knox, of Waynesburg, one containing 29,701.3 acres and the other 50,012 acres, the consideration being \$31,885.32. Two tracts were purchased from J. R. Nutt, of Cleveland, Ohio, one containing 171 acres 107 perches, and the other 174 acres 137 perches. The consideration was \$153,706.50.

Savan—Vernon F. Taylor, of Indiana, has sold his Savan mine to E. Walker Smith, of Indiana, and Louis Neil, of Kent. The new owners will continue under the old name of the Savan Colliery Co. The consideration is understood to be \$50,000.

Starford—The new mine and tippie of Hetrick & Steward has been put into operation and the shipment of coal has begun. The mine is located on the Cherrytree & Dixonville R. R. and shipment can be made by New York Central or Pennsylvania.

Iselin—The Brown Coal Co. has opened the old Hart mine here and is loading coal over the Lowther Coal Co. tippie near Clarksburg.

Uniontown—An order from the Federal Fuel Administration prohibiting the reclaiming of coke and coal from the breeze dumps after 7 o'clock Monday, Sept. 16, has brought consternation to the many local workers of these dumps. The Fuel Administration believes that man power is better concentrated in straight mining and coke manufacturing. Many thousands of dollars have been invested in this side line and profits have been large.

Connellsville—For the six months ended Aug. 31 Luigi Tucci, 33 years old and single, an Italian miner at Leisenring No. 2, drew down just \$1,543.18 in pay. His lowest two weeks' pay check was \$106.58, and his largest \$148.28. He lost two days' time in the entire half-year stretch.

WEST VIRGINIA

Logan—Coal is now being shipped from the No. 1 and No. 2 mines of the Jones Coal Land Co. on Dingess Run creek in Logan County.

Fairmont—Among numerous improvements being made at the mines of the Horchler Coal Mining Co. at Hiorra, in the Preston-Monongalia field is the construction of a new boiler house and a new bin for the tippie there.

Kingwood—The Irvona Coal Co. expects in the near future to reopen its No. 1 mine, for which a modern tippie has been constructed. Motor haulage is also one of the improvements just made at this operation, of which D. J. Williams is superintendent.

The work of equipping the mine of the Hoffman Coal Co. has been completed and the company has also built a new office building as well as other buildings usually needed for such an operation.

Charleston—The State Department of Mines will conduct special examinations for mine foremen and bosses at Charleston, Oct. 7-8 and Dec. 9-10, making both examinations on Monday and Tuesday, so that those contemplating taking the examination can travel on Sunday.

Moundsville—Charles Fogle, employed at a local mine, has made a new individual record for loading coal. In one day of eight hours he loaded 30 tons, receiving \$18.20 for the day's work. He is 55 years of age and his last 11 days earnings totaled \$169.69.

Newburgh—Among numerous improvements made at the plant of the Irvin Coal Co. at this place are the construction of new outside buildings. The company has also equipped its plant with motor haulage as a means of speeding up production.

Dan—The Bradshaw Coal Co. is extending the transmission lines of the Appalachian Power Co. from English, W. Va., to its mines at Dan. The company expects to have power available at the mines by Nov. 1.

INDIANA

Petersburg—The Pike County Coal Co., which operates a mine just east of Petersburg, has increased its capital stock from \$100,000 to \$250,000 and is enlarging its railroad facilities by building one additional mile of track. Hoisting machinery is being put in to increase the capacity of the mine to 4000 tons.

Brazil—The scarcity of coal miners has caused a number of retired miners to return to active work. Permits have been issued by the Clay County miners' examining board, in session in this city, to a number of miners who have been out of active work for three or four years. It is said that there is hardly a mine in the state which is not working short-handed and some of them have lost almost 50 per cent. of their working forces through the draft and volunteer enlistments.

ILLINOIS

Harrisburg—All mines in Saline County have resumed operations after four days of idleness caused by Big Four switchmen quitting work because two roadmen began working in the railroad yards here. Employment was refused 64 switchmen, and new men have been sent to Harrisburg to take their places.

Peoria—Declaring themselves to be 100 per cent. American, more than 300 miners, members of local union 1800, have pledged themselves to produce the greatest tonnage of coal possible to aid in winning the war. This action was taken following the reading of President Wilson's appeal that all energies be directed toward the mining of fuel during the period of the war.

Centralia—Work at the No. 5 mine of the Centralia Coal Co. was resumed after a three-day suspension caused by the miners' dissatisfaction over the discontinuance of the 2 o'clock cage, which is an alleged violation of an agreement between mine officials and the miners. District President McAllister, of DuQuoin, arrived in Centralia to aid in adjusting matters and upon his advice work was resumed. The number of men affected by the three-day cessation was 600, and the loss of coal during the three days' idleness was 7800 tons.

Decatur—The Decatur Coal Co. is asking for an injunction against William Kastner, an employee, and the members of the industrial commission, which ordered the coal company to give him a life pension. The suit is filed by the Employers Liability Insurance Co. for the Decatur Coal Co. On May 27, 1917, Kastner was injured in the mine of the Decatur Coal Co. and in February, 1918, at a hearing before an industrial commission arbitrator, he was given \$6 a week allowance for 41 weeks, and a further sum of \$6 a week for 175 weeks for the loss of his left leg, injured in the accident. The company was dissatisfied and filed an appeal, the matter being taken to the industrial commission. This commission awarded Kastner \$6 a week for 272 weeks and \$2.48 for one week. After the 272 weeks period has expired the Decatur Coal Co. is to pay him \$10.90 a month as long as he lives. The company now contends that it agreed with Kastner two days before the finding of the industrial commission on a settlement on the basis of the first award and now seeks an injunction to set aside the results of the appeal.

Collinsville—Digging coal is better than being chief of police and water commissioner in Collinsville, Tony Staten, chief of police, and Sam Harrison, water commissioner, have resigned to go back to the mines. They have been getting \$100 a month each as officials. They say they can make twice as much as miners.

Benton—T. O. Ratramel has just completed a successful drilling at Dale, near Benton, on the Louisville & Nashville R.R., where he struck a good vein of coal 7 ft. 9 in. thick. Ratramel has a contract to drill down to the lower vein before completing work. Dale and McLeansboro capital is interested, and a \$60,000 company has been incorporated to sink a shaft and to operate a mine. A total of 10,000 acres of land has been leased, and a mine will be operated on a royalty basis.

ALABAMA

Lewisburg—The mines of the Alabama Co., which were put out of commission by a cloudburst late the evening of Tuesday, Sept. 5, will not be in a position to resume

operations for 30 days or more, pending the repair of extensive damage. John Pennington, contractor, and three negro miners lost their lives in the catastrophe. The work of rescuing the men caught underground following the cloudburst reflects great credit on the officials of the company, C. H. Nesbitt, chief state mine inspector, and others who remained in charge until every man had been removed. A number of large auxiliary pumps are working steadily to clear the mine of water. It is estimated that damage to the mouth of the mine will exceed \$15,000, while the loss underground is placed in excess of \$10,000. The Lewisburg mines have been in constant operation for 30 years and the output is approximately 1500 tons of coal a day.

Foreign News

Victoria, B. C.—Permission has been granted by George Wilkinson, Chief Inspector of Mines for British Columbia, for the opening of the Jingle Pot coal mine, Vancouver-Nanaimo Coal Mining Co., Ltd., which was ordered sealed ten months ago, owing to the discovery of fire. In the interim the mine has been flooded.

Vancouver Island coal is being utilized by the United States Navy Department on a large scale, the Canadian Collieries (Dunsmuir), Ltd., having entered into a contract to supply as much as can be mined for export. One of the company's officials, in confirming the report, stated that there was no limit to the amount, it being understood that the Navy Department would take as much as could be delivered. Some weeks ago the first cargo of coal under the new arrangement was loaded by a vessel of the United States Shipping Board's fleet at Comox for delivery at the Pearl Harbor Naval Station, Hawaiian Islands. Others have made calls for coal, having a similar destination, and all ships making their base at the Bremerton navy yard will burn Comox coal. This coal, some years ago, was subjected to exhaustive tests as to its suitability for use on American warships and, as a result, the British Columbia production was declared to be almost as good in steaming qualities as the American navy standards.

Personals

Clarence W. Hippard has been appointed research graduate assistant in mining engineering in the University of Illinois. He graduated from the Missouri School of Mines in 1917 with the degree of bachelor of science in mine engineering. From 1909 to 1913 he was engaged in practical coal mining and served one year as assayer for the Stewart Mining Co. at Kellogg, Idaho.

W. E. Seese, of Echo, Penn., has resigned the superintendency of the Black Diamond mines in order to devote his time to several operations of his own in the same locality. Mr. Seese had been superintendent of the Black Diamond operations for about six years.

L. A. Osborn, of Welch, W. V., has succeeded C. L. Biddison as general manager of the Bradshaw Coal Co. at Dan, W. Va.

John Gibson, Jr., of Pittsburgh, Penn., general manager of the Penn Smokeless Coal Co., operating in Somerset County, Pennsylvania, has been commissioned captain of engineers in the army and will leave in ten days for Camp Humphries, near Washington, D. C.

Francis W. Lockhart, of Somerset, Penn., secretary of the Somerset County Coal Operators' Association, has been appointed production manager for that district.

M. M. Broughton, of Connellsville, Penn., superintendent of the Connellsville division of the Baltimore & Ohio R. R., has resigned his position to become connected as a partner in a new coal company.

George Cokely has resigned his position as superintendent of the Tide mines of the Tide Coal Mining Co. near Homer City, Penn.

Frank H. Crookard, for the past year president of the Nova Scotia Steel and Coal Co., has accepted the presidency of the Woodward Iron Co., of Birmingham, Ala.

Obituary

Fred Lesser, mine foreman of the J. S. Wentz Co., Hazlebrook colliery, died recently at the Hazleton Hospital, due to an attack of intestinal trouble.

Publications Received

The Santo Tomas Cannel Coal, Webb County, Texas. By George H. Ashley. Department of the Interior, United States Geological Survey. Bulletin 691-I. Illustrated, 6 x 9 inches.

Methane Accumulations from Interrupted Ventilation, with Special Reference to Coal Mines in Illinois and Indiana. By Howard I. Smith and Robert J. Hamon. Department of the Interior, Bureau of Mines. Technical paper 190. Illustrated, 42 pp., 6 x 9 inches.

Trade Catalogs

"The Standard" Scales. The Standard Scale and Supply Co., Pittsburgh, Penn. Catalog A.235. Pp. 48; 8½ x 11 in.; illustrated. The scales described and illustrated in this handsomely printed catalog include those that will weigh anything from a small package to a carload of coal. A telegraphic code and comprehensive index is included.

Industrial News

Louisville, Ky.—The Mountain Gem Coal Mining Co. has filed amended articles authorizing an increase in the capital stock from \$10,000 to \$20,000.

Jacksboro, Tenn.—The Smith Blue Gem Coal Co., capital \$4000, has been incorporated by A. W. Smith, Jr., R. Y. Gray, Jr., Jay Lindsay and others.

Youngstown, Ohio.—The United States Railroad Administration has authorized the construction of the 5½ mile railroad required to connect the coal property of the Youngstown Sheet and Tube Co. in southwestern Pennsylvania with the steam carrier serving that territory.

Charleston, W. Va.—Suit has been instituted by the New River Co. and by the other companies operating in the same section against the Virginian Power Co. for \$150,000 for damages for failure to furnish power to operate the mines in the territory covered by the power company.

Frontenac, Kan.—Two or three coal mining plants will be erected by the Jackson-Walker Coal Co. at an expenditure of \$25,000. It is reported that the material needed will include belts, boilers, cages, cars, concrete, conveyors, hoists, lumber and track for inside and outside the mines.

Cleveland, Ohio.—The Jeffrey Manufacturing Co., of Columbus, Ohio, has reopened its branch office at 437 Leader-News Building. P. C. Dierdorff and C. B. Reed, who have had years of experience in the solving of elevating, conveying, crushing and mining machinery problems, will be in charge.

Arma, Kan.—The Central Coal and Coke Co. will start work about Oct. 1 on the opening of two mines, each to cost in the neighborhood of \$25,000. The material and equipment not yet purchased includes lumber, roofing, engine, boilers, hoists, screens, conveyors, belts, concrete mill and hardware.

Pittsburg, Kan.—Work will be started Oct. 1 on the coal mining plant of the Machle-Clemens Co. D. W. Jones, the superintendent in charge, states that about \$25,000 will be expended. Some of the material and equipment not yet ordered comprises belts, boilers, cages, car loading device, coal cars, conveyors, hoists, lumber, etc.

Cleveland, Ohio.—To facilitate the handling of its mine hoist business, the Ridgerwood Manufacturing Co. has opened a branch office in the Union National Bank Building. Ernest F. Pegg, who until recently was associated with the W. M. Pattison Supply Co., former selling agent for the Ridgerwood Company, will be in charge of the new office.

Milwaukee, Wis.—Six steel cranes (Brown-hoists) formerly used by the Milwaukee Western Fuel Co. have been commandeered by the Government and will be dismantled and shipped to war plants in the East. The cranes originally cost \$125,000, but at the present price of materials and labor it is said they could not be constructed for less than \$500,000.

St. Louis, Mo.—Barge service for coal and other freight will be inaugurated on the Mississippi and Black Warrior rivers on Sept. 28. At 5 p. m. that day a fleet of seven towboats and 30 barges will leave St. Louis for the first trip down the river.

According to announcement stops will be made only at the cities which have provided suitable docking facilities.

Washington, D. C.—The Interstate Commerce Commission was asked recently by the Western Trunk Line Committee of Chicago, representing 30 railroads, some of which are not under federal control, to grant an increase of freight rates on interline shipments of bituminous coal so that the rate on non-controlled lines will be the same as on Federal controlled lines.

Indianapolis, Ind.—It is believed that the production of 2,886,422 tons of coal during the month of August has established a new record in the hoisting of coal by Hoosier mines. The record of July, 2,865,163 tons, has been exceeded by the August production. This new record has been established in spite of the fact that work in the Knox County mining fields was hindered for several days on account of a shortage of cars.

Indianapolis, Ind.—A total of 12,000 additional tons of coal mined in Indiana will be delivered daily to the number of railroad lines to make up in part for the portion of the railroads' supply of coal taken over by the Government officials for use in navy and transport work. The daily average of Indiana coal used by the railroads has been 18,000 tons during the recent weeks and this amount will now be raised to 30,000 tons of coal daily.

Pittsburg, Kan.—The Western Coal Co., which has started work on the development of its coal property at Franklin, Kan., expects to be ready to ship coal by the latter part of November. About \$25,000 is to be expended on lumber, concrete, hoists, wire cable, engine, boilers, belts, pumps, roofing, coal cars, tracks, conveyors, screens, pipe, etc. It is understood that none of this equipment and material has been purchased. Philip Rayer is superintendent in charge.

St. Louis, Mo.—Coal is to be stored in the streets of St. Louis if there is not room enough elsewhere. Fuel Administrator Crossley has ordered the St. Louis Board of Public Service to issue a permit to the Monsanto Chemical Co. for the use of Geyer Ave. east of Second St. for that purpose. The company has not adequate storage facilities without using the street. It is engaged on war contracts. This is the first time that the use of a street for that purpose has been allowed.

Whitesburg, Ky.—The Elkhorn & Jellico Coal Co., which was incorporated in July, has been organized with M. K. Marlowe as president and general manager; H. L. McGhee, vice president; P. E. Marlowe, secretary; and James A. Marlowe, treasurer. The company has 550 acres of coal land to develop, and has leased other lands and proposes development of a townsite, etc. The company is capitalized at \$500,000 and plans immediate development, having started placing inquiries for mine cars and equipment.

Birmingham, Ala.—Motor truck transportation of coal on an extensive scale is being projected by the Birmingham Civil Association, working in conjunction with the County Board of Revenue and the Board of City Commissioners. A contract has been made with the Jenkins Motor Co. to establish two motor lines within the next 30 days capable of moving 200 tons of coal daily. Plans have been perfected for the establishment of a municipal coal yard to supply domestic trade as soon as the movement of coal starts.

Fairmont, W. Va.—Team-track loaders in the Fairmont district, which includes 12½ counties of West Virginia, are back on their old basis. The plan of D. R. Lawson, district representative, to have all wagon-mine coal consigned to the Fuel Administration at the scales at Keyser proved unwise and resulted in a congestion of box cars of coal. Mr. Lawson called team-track loaders together and explained the situation, putting it in such a light as to win their interest for the report system, which wagon-mine operators had not taken seriously up to this time.

Toledo, Ohio.—Considerable activity was shown at the Toledo docks in loading lake coal during the week ending Sept. 7. This activity is taken as an indication that the lake quota will be made up unless some untoward event occurs. The Hocking Valley docks loaded 227,252 tons during the week as compared with 130,878 tons during the previous week, making a total of 3,089,542 tons for the season. The Toledo & Ohio Central docks loaded 66,000 tons as compared with 81,000 tons the previous week, making a total of 1,357,000 tons for the season.

Wellsburg, W. Va.—The Electric Mining Co., of Wheeling, a \$1,000,000 corporation, has been granted a charter in Charleston to

operate mining interests in Brooke County. The company a short time ago acquired control of the J. V. Thompson Coal interests, and one of the most modern mines in West Virginia will be put in operation within a short time. About \$550,000 will be expended for machinery, etc. Stockholders include R. E. Breed and H. L. Montgomery, New York; H. L. Finley, Brooklyn; George N. Tidd, Elizabeth, N. J., and Frank B. Ball, Plainfield, N. J.

Harrisburg, Penn.—John T. Dempsey, president of the Miners Union in District No. 1, and Samuel J. Jennings, assistant to the president of the West End and Price-Pancoast coal companies, were on Sept. 12 named additional members of the board of appeals for the middle district of Pennsylvania, division No. 1, with headquarters in Scranton. The appointment of Mr. Dempsey and Mr. Jennings will give the miners' union and the coal industry three men on the board, the other being Thomas Davis, of Nanticoke, who is an international executive board member of the union.

Lexington, Ky.—The May Branch Coal Co., of Lexington, has been reorganized through filing amended articles of incorporation in which the name of the company is changed to the White Ash Fuel Co., while the capital stock is increased from \$25,000 to \$75,000, and arrangements made for opening a branch office at White Ash, where the company has mines. John W. Masner, W. M. Parrish and James T. Garey, of Lexington, are directors and officials of the company. The amended articles allow the company to deal in timber, coal and mineral lands, and sell the products of such lands.

Frankfort, Ky.—The Secretary of State has handled the following new corporations charters or amendments within the past few days: Blackey Coal Co., Letcher County, increasing capital from \$3000 to \$40,000. East Kentucky Coal Co., Perry, increasing capital from \$25,000 to \$50,000. Redwine Cannel Coal Co., Morgan County, increasing capital from \$2000 to \$10,000. Bruner Coal Co., Manchester, Ky., capital \$500; incorporators, G. C. Hibbard, Gertrude Hibbard and G. B. Bruner. Lackey Collieries Co., Ashland, Ky., capital \$10,000, R. D. Clere, Myrtle Dennis and E. E. Seaton. Upper Harlan Coal Co., Harlan, increasing capital from \$60,000 to \$100,000.

St. Louis, Mo.—The recent action of the St. Louis Fuel Committee in ordering a reduction in the price of coke from \$13 to \$11.25 a ton has been confirmed by Federal Administrator Garfield. When the price was fixed by the St. Louis committee Aug. 6, the coke distributors balked and continued to do business on the basis of \$13 a ton. Meetings were held but no settlement was arrived at. The matter was referred to Garfield and he summoned the parties to Washington. The committee was represented by Advisor E. J. Wallace and C. E. Morrow. The reduced price was ordered enforced as of date Aug. 28. Retailers who have purchased on the basis of the higher price will be reimbursed \$1.75.

Charleston, W. Va.—The necessary sanction to install sidings having been secured from the Fuel Administration, the Newcourt Coal Co., with an authorized capital of \$100,000, will at once proceed to develop a lease of 1300 acres in the Black Band seam, near Brounland, on Brier Creek, in the Coal River section, tests showing a thickness of from 43 to 54 in. in the coal. A modern tippie will be constructed, and when the plant which is to be electrically equipped is ready for operation, it is estimated that the capacity of the plant will be at least 200 tons a day, and later from 500 to 1000 tons a day. W. J. Newenham, formerly of the Pocahontas Consolidated Collieries Co. and of the H. C. Frick Coke Co., has been made president of the new company, with T. E. Courtney, of Charleston, as secretary-treasurer.

Pittsburgh, Penn.—Nine large coal operations in western Pennsylvania, southern Ohio and West Virginia, which were originally purchased by John H. Jones, have been taken over by the Consumers Fuel Co., a Pennsylvania corporation. This company, and the Consolidated Fuel Co., an Ohio corporation with which it is closely allied, have a combined capitalization of nearly \$4,000,000. The two organizations are now producing yearly 2,000,000 tons of steam, gas and byproduct coal, and expect to increase the production ultimately to 4,000,000 tons a year. Mr. Jones is retained in charge of production. The companies merged include the Miners Block Coal Co., the Maple Hocking Coal Co., the Goucher Mine Co., the Miners Cooperative Co., the Louise Coal Co., the Quality Cement Coal Co., and the Rachel Gas Coal Co.

MARKET DEPARTMENT

Weekly Review

Labor Day Cuts Into Coal Production—Many Miners Made Up Holiday by Working Extra Time—Soft Coal 17,000,000 Net Tons Behind Schedule—Anthracite Output Ahead of Last Year—No Change in Market Conditions

AS was to be expected, the observance of the Labor Day holiday throughout the mining regions cut into the production of both anthracite and bituminous coal during the week ended Sept. 7. Bituminous output totalled 11,249,000 net tons for the week (5½ days), while anthracite shipments for the same period amounted to 1,617,579 net tons.

It should be recorded, however, that the miners at quite a few operations made up for the holiday by working extra time the Saturday preceding, and another fact which should be emphasized is that the percentage of ab-

senteeism the day following the holiday was negligible. Appeals to the miners for more regular working time are undoubtedly having their effect.

Bituminous coal output is now approximately 17,000,000 net tons behind schedule, and production for the rest of the coal year must be maintained at the rate of 2,041,000 net tons a day if the deficit is to be made up. The car supply is now excellent, however, and the bituminous mines have everything in their favor for a drive on greater output. Anthracite production for the coal year to date is estimated at 45,645,597 net tons, which is an in-

crease of 1,084,000 net tons over the same period of last year.

Market conditions present no radical changes. The Fuel Administration has the distribution and allotment of all grades of coal well under control, and a determined effort is being made to supply the Northwest before navigation on the lakes closes for the season. Dealers have many unfilled orders on their books, but the total quantity of coal delivered to domestic consumers to date is far greater than was true at this time last year. Conservation, diligently practiced, will be necessary, however, to avert a shortage this year.

WEEKLY COAL PRODUCTION

Production of bituminous coal during the week of Sept. 7, while limited by the loss of time on Labor Day, exceeded production during the week of July 6 when production was also limited 1,000,000 net tons by a holiday. The output during the current week (including lignite and coal made into coke), is estimated at 11,249,000 net tons, a decrease compared with the week preceding of 1,455,000 net tons or 11.5 per cent. and an increase over the corresponding week of last year by 1,257,000 net tons or 11.2 per cent. The average production per working day during the week of Sept. 7 (5½ days), is estimated at 2,110,000 net tons as against 2,117,000 net tons during the week of Aug. 31 and as against 1,874,000 net tons during the same week of 1917. The loss of time during the current week places production for the coal year to date approximately 17,000,000 tons behind the summer requirements outlined by the Fuel

Administration. Material decreases were reported in central Pennsylvania where shipments amounted to 32,122 carloads against 36,724 carloads during the week of Aug. 31, from western Pennsylvania, where shipments amounted to 9098 as against 12,048 carloads; from Ohio, where shipments amounted to 22,545 carloads as against 26,942 carloads; and from the districts including Illinois, Indiana and western Kentucky, where shipments amounted to 44,085 carloads as against 49,614 carloads; and from the district including Iowa, Texas and western states, where shipments amounted to 12,632 carloads, as against 15,603 carloads. Compared with the corresponding week of 1917, all districts, with the exception of Michigan, report considerable improvement.

A considerable decrease occurred in dumpings at lake ports during the week ended Sept. 8. The tonnage dumped during this week (including bunker coal), is estimated at 1,012,297 net tons, a decrease compared with the week preceding of 13 per cent. and with the weekly average during July, August and September of 3 per cent.

Shipments of bituminous coal to New England during the week ended Sept. 7 are estimated at 574,194 net tons as against 604,158 net tons during the week preceding, or a decrease of 5 per cent. Compared with the weekly average for the coal year to date, shipments during the current week were approximately 3 per cent. higher. Rail receipts through New England gateways during the week of the 7th are estimated at 226,130 net tons, slightly in excess of the receipts during the week preceding and the weekly average. Tidewater shipments, amounting to 348,064 net tons, while approximately 10 per cent below the shipments during the week of Aug. 31, are slightly in excess of the weekly average. Shipments during the week declined from all harbors with the exception of Baltimore, from which harbor shipments increased 6.5 per cent. while shipments from New York and Philadelphia decreased 22.3 per cent. and from Hampton Roads 8.3 per cent.

Shipments of bituminous coal during the week ended Sept. 7 not only fell below the shipments during the week preceding, but also below the weekly average for the coal year to date. Shipments from North Atlantic ports and Hampton Roads are estimated at 895,278 net tons, all harbors falling behind the performance of the week preceding. Shipments from New York and Philadelphia decreased 6 per cent. from Baltimore, 0.6 per cent. and from Hampton Roads, 1.8 per cent.

Production of beehive coke in the United States during the week ended Sept. 7 is estimated at 616,000 net tons as against 608,000 net tons during the week preceding,

or an increase of approximately 2 per cent. The operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania report production for the week ended Sept. 7 at 390,010 net tons and the operation of their plants at 76.2 per cent. of present capacity. Yard labor shortage was slightly greater than during the week preceding, but such loss was offset by causes not reported.

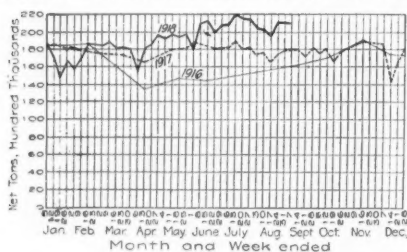
Operating conditions in the byproduct industry improved slightly during the week ended Sept. 7, such slight improvement being attributed by the operators to a better supply of byproduct coal. The plants of the country were operated during the current week at 90.6 per cent. of their present capacity, shortage of byproduct coal causing a loss of present capacity of 2.5 per cent., labor trouble 1.5 per cent., repairs to plants 4.1 per cent. and all other causes 1.3 per cent. Material improvement occurred in Illinois, Kentucky, Maryland and Pennsylvania. In Illinois the improvement is attributed to a better supply of byproduct coal, in Kentucky to repaired plants, and in Maryland and Pennsylvania to better labor conditions. Tennessee was the lone state reporting material decrease during the week, the cause not being reported. Increased capacity of Illinois plants during the week was brought about by an increase at the Semet-Solvay Co.'s plants at South Chicago, Ill.

BUSINESS OPINIONS

Marshall Field & Co.—Current shipments were largely ahead of the corresponding week of a year ago. Road sales for immediate and spring delivery also showed an increase. Not quite so many customers were in the house compared with the similar period of 1917. Collections continue excellent.

Bradstreet's—Insistent demand for war materials, the return of confidence in previously drought-stricken areas, indications of a heavily increased winter-wheat acreage, a record movement of grain, high prices for all farm products, and the certainty that orders offering are far larger than supplies, stand out as the prominent features of this week's news. Widespread rains putting the soil generally in good condition for a record winter-wheat seeding, some improvement in cotton and corn that had not been injured beyond repair, and unprecedentedly high prices for all kinds of farm produce and meat-producing animals, have removed some of the hesitation shown in the southern and southwestern sections.

American Wool and Cotton Reporter—There is just as much uncertainty as there was some time ago in regard to the available supply of raw wools. Until the maximum army has been developed, it is quite



Administration and makes necessary an average daily production during the balance of the coal year of 2,041,000 net tons to make up this deficit. This, it will be noted, is 3.2 per cent. in excess of the average daily production for the coal year to date.

Production of anthracite during the week ended Sept. 7 is estimated at 1,617,579 net tons, 28 per cent. less than the production during the week preceding, due mainly to loss of time on Labor Day, and 3 per cent. less than the corresponding week of last year. The daily average during the week of Sept. 7 is estimated at 323,516 net tons as against 338,111 net tons during the coal year to date and as against the daily average of 330,081 net tons during the corresponding period of 1917. The total production for the coal year to date is estimated at 45,645,597 net tons, an increase over the same period of last year of 2.4 per cent.

Shipments of bituminous coal, during the week of Sept. 7, decreased from all districts with the exception of Southwest Virginia, where the increase was slight and amounted to approximately 1 per cent.

likely that a conservative policy will be followed in regard to letting out wool for civilian fabric production. Some hope that better conditions will come about is held out through a possible agreement as to raw material supply for all of the allies, and by the increased purchasing of South American wool by the commission handling this portion of the problem. In the cotton market it is thought that with the scarcity of money the banks in the South are not going to be so lenient as previously. For this reason, it will be necessary for many of the Southern farmers to sell their cotton. This ought to be felt fairly extensively and should reduce the price of futures on the exchange when the movement takes place.

The Iron Age—The vast scale of the plans for the offensive in France appears in weekly calls for more steel. The distribution of 34,000 tons of barbed wire for the Government is just completed, with 22,000 tons for France in abeyance, when larger war demands for this product came up than have been considered at any time thus far. In the Cleveland district, the placing of 10,000,000 additional shell forgings is one indication of the tremendous recent enlargement of the munitions program. The ordinary consumer's chance of getting steel, judged solely by the developments of the past week, will grow steadily less in the final quarter of the year. Some letting down of demand may come in the structural field. Probably all the fabricated ship work for next year has been contracted for, and it is expected that all essential work will be let before 1919, with a total that will not keep the monthly volume of awards to the 60 to 65 per cent. of capacity that has been the rule so far this year. The poor financial showing of the railroads may rule out much railroad bridge work that earlier was thought certain.

Atlantic Seaboard

BOSTON

Diminished receipts already noticeable. Hampton Roads loading continues slow. Baltimore dispatch not improved. Byproduct and railroad fuel tonnages readjusted. Movement slackens all along the line. Long lists of consignees embargoed from central Pennsylvania. Rail movement falls off slightly, but full effect of embargoes not yet felt. Box cars come forward in volume, mainly to New England, although number is expected to be cut down. Several steamers withdrawn from coastwise coal service, but more due from the lakes. Fires in railroad storage interfere with receipts. Connecticut an area that needs coal. Movement to New York piers not yet sufficiently increased. Baltimore & Ohio movement reduced. Anthracite shipments also sag slightly. Average daily receipts at gateways less than in any month since February. No change as yet in retail prices.

Bituminous—The trade is beginning to realize that already coal is coming forward in less volume to New England. Instead of the harbor being congested with ships, so far as unloading facilities were concerned, there was actual inquiry this week for spot cargoes. A week ago it was next to impossible to comply with the Washington ruling as to permissible stocks and still free cargoes that were waiting to be discharged. It is felt that the visit here last week of J. D. A. Morrow, of the United States Fuel Administration, contributed a great deal to a better understanding on the part of Washington as to the actual situation here, and it is likely there will be a more evenly managed distribution, especially with regard to Hampton Roads. Close observers seem to be agreed that another ten days will see the New England situation materially changed as to current receipts. Both by water and rail there are influences at work that will undoubtedly reduce flow of coal this way. Fuel authorities here are keeping close watch of local conditions and where a plant is found to have an undue supply on hand the fact is promptly reported. On the other hand, if it is found that a plant should not have had coal shut off at the source, the mistake is promptly rectified.

Loading at the Virginia terminal continues slow and causes much anxiety to New England consumers who are counted upon to pay the demurrage bills. The tonnage of bottoms waiting is still far in excess of coal available, and it is probable that this will continue indefinitely or until the number of bottoms is reduced to a really considerable extent. More and more of the modern type of collier, self-trimming and of fair speed, will be taken for overseas work as the season advances

and requirements for supply service are increased. The Inter-Allied Shipping Board is watching this situation carefully.

Baltimore dispatch varies from Hampton Roads only because less tonnage is involved. The flow of coal has slackened materially, but steamers are still being entered to load. It is not that the coal is moving to the New York piers rather than to Curtis Bay, but that more is being ordered west and to plants along the line.

District representatives and others have been engaged now for more than a week in readjusting tonnages for railroad fuel and for byproduct use. Government requisitions for byproduct plants have enormously increased the last few weeks, and to meet these some radical cuts have had to be made in other directions.

Railroad fuel receipts are about the same, although due for an increase soon. The average for 12 days in September for bituminous at the five gateways, commercial coal and railroad fuel together, was 708 cars, or less than the average in March, 1918. Particularly is this cut in receipts noticed in the last few days, the average of which would be 50 cars less per day. It is another sign of the decreased shipments that prevail or are soon to prevail in all quarters. It is likely that September as a whole will show a very marked reduction in New England receipts, especially where the full effect of embargoes is evident.

Wagon-loaded coal continues to come forward in volume, and practically 80 per cent. of that from the central Pennsylvania district comes to New England. Early in July this coal was most welcome to New England and the fuel authorities have been grateful for the extra volume of coal this has meant. Everything has been done in the way of prompt payments, etc., to make shippers feel the coal was being put to good use, but latterly it has become increasingly difficult to find consignments for the whole 600 cars per week. Labor is scarce, the railroad authorities are constantly complaining of delays in unloading, and the inferior quality of much of the coal have all been against a growing tonnage. The result is that for the next few weeks New England will hardly be in position to take more than half what was readily absorbed a few weeks ago.

Colliers, in tonnage amounting to approximately 90,000 tons, have been released from the trade and are now being made ready for general cargo use to France. Most of these were ships not well adapted to coal carrying, although some were built for this trade. The latter will doubtless be requisitioned as colliers, to help meet the demand for coal overseas.

Perhaps the one area in New England where reserves are less than the Washington rule allows is Connecticut. Industries in that state have not had the advantage of the increased movement of steamers because there are no ports where such ships could unload. In fact, the increased volume of coal for Curtis Bay, Baltimore, meant reduced shipments to the New York piers and these have not yet been built up to a point where cargoes could be regularly loaded for points on Long Island Sound where the need is greatest.

Anthracite—Receipts of domestic sizes both all-rail and by water have also sagged the past fortnight. The average number of cars per day at the New England gateways for 12 days in August was 452. Some of the days recently the movement has fallen below the mark for any week since February. Receipts of anthracite screenings remain fairly stable, although practically all this coal is moving on old contracts.

No change has yet been made in retail prices to affect the recent 30c. advance. Dealers are hard put to it to make deliveries in sufficient volume. Some retailers are making an effort to deliver at least one ton on each requisition on file.

NEW YORK

Dumpings of anthracite at the local docks show a decrease, but dealers are kept busy. Conservation of fuel urged by Fuel Administrators if serious shortage is to be averted this winter. Producers directed to increase shipments to certain localities. Bituminous market in better condition than it was a year ago. Demand continues heavy.

Anthracite—Reports of heavy production and shipments from the anthracite fields cannot be said to be reflected in receipts here. While shippers and dealers are not gloomy as to what conditions might be next winter, they are not over-enthusiastic as to the prospects. They confess to handling an unusual amount of coal this summer and the retail dealers admit having placed a heavier tonnage than usual;

still they say that more coal must be sent to this market if serious conditions are to be averted. One shipper who handles a heavy tonnage, especially through New England, probably voiced the opinion of most members of the trade similarly situated, when he said, in reply to a question concerning trade conditions: "We are just holding on."

Urging conservation of fuel several statements were issued from the offices of the local Fuel Administrators last week. One of these limited the amount of coal to be delivered to consumers until other consumers have received a portion of their winter's supply.

Receipts here are reflected in the number of cars of anthracite dumped at the local docks. For the seven-day period ending Sept. 13, this amounted to 6635 cars as against 6719 cars for the week ending Sept. 6, a decrease of 84 cars.

There has been no relative change in the positions of the domestic coals. Demand for each is about evenly divided, stove being the shortest. The steam coals are differently situated. Buckwheat No. 1 is long, rice moves slowly, and barley of which there was an overabundance a few weeks ago, is short with some of the large producers.

The retail situation is active. While the dealers are not getting all the coal they would like they are kept busy because of the lack of labor. They admit putting considerable more coal in consumers' bins than usual, but their orders are far from being cleaned up. In the Bronx the dealers have fixed upon a week in October as a time to make a clean-up of one or two ton orders.

E. E. Hawkins, Jr., Fuel Administrator for Suffolk County, Long Island, has announced the allotments of domestic sizes of anthracite for the various towns and cities of that county for the fall and winter, and also the maximum prices allowed for the various grades of coal. The prices average about \$1 a ton higher than those of the April to September schedule and range from \$10.05 to \$10.55 for broken and egg sizes; from \$10.30 to \$10.75 for stove and chestnut, and from \$9.40 to \$10 for pea coal, the variations in prices being based on transportation charges. The allotment is 189,604 gross tons, not including the tonnage needed in Camp Upton. Mr. Hawkins believes that with economy there will be sufficient coal to go around. No coal is allowed for houses opened only part time, such as summer residences which it has been the owners' custom to visit occasionally in winter. The supply is cut for commercial greenhouses to half of demands, and none is allowed for private greenhouses.

Current quotations, per gross tons, f.o.b., tidewater, at the lower ports are as follows:

	Circular	Individual	Circular	Individual
Broken...	\$6.75	\$7.50	Buck...	\$5.10
Egg....	6.65	7.40	Rice...	4.65
Stove...	6.90	7.65	Barley...	4.15
Chestnut	7.00	7.75	Boiler...	4.60
Pea....	5.50	6.25		

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates. Prices for buckwheat, rice, barley and boiler are not fixed by the Government.

Bituminous—The bituminous situation continues to move slowly, with comparatively little tonnage moving compared with the demand. While some consumers have large stocks on hand others have barely enough to keep their furnaces going. However, the situation as a whole is better than it was at this time last year.

Efforts are being made to secure a modification of the order of Aug. 2 fixing a maximum storage period, and already nearby New Jersey manufacturers believe they will be able to secure an increase of storage time from 30 to 60 days. After argument by the committee representing the New Jersey manufacturers it is said consent was given whereby that State is allowed an extra supply of coal on tide-water deliveries.

There was an improvement in the dumpings at the local docks during the week ending Sept. 13, 7650 cars of bituminous having been dumped as against 6823 cars dumped the previous week, an increase of 807 cars. Much of this coal was sent, however, to New England and Long Island Sound points, with the result that local dealers did not reap much benefit.

The bunker situation is looming up again. Because of the vast number of vessels continually in the harbor demands for this grade of coal are heavy and shippers are sometimes hard pressed, but so far there has been no delay in loading.

There is enough of the ordinary grades of coal to go around, but spot buyers can-

not be supplied, free coals not being obtainable.

This is due in part to the shipping by nearly every operator, on orders from Washington, of a substantial part of his output, leaving the balance for his old customers.

Current quotations, based on Government prices at the mines, net ton, f.o.b., tide-water, at the lower ports, are as follows:

	Mine Gross	F. o. b. N. Y. Gross
Central Pennsylvania:		
Mine-Run, prepared or slack.....	\$3.30	\$5.45
Upper Potomac, Cumberland, and Piedmont Fields:		
Run-of-Mine.....	3.08	5.23
Prepared.....	3.36	5.51
Slack.....	2.80	4.95

Quotations at the upper ports are 5c. higher.

PHILADELPHIA

Anthracite trade stirred by cool weather. Customers complain of distribution. New allotment figures given out. Shipments show falling off. Operators hopeful as to future. Criticism as to retail prices. Steam sizes show some easing off. Little demand for culm. Bituminous helped by improved car supply. Distribution plans working well. Brokers easier.

Anthracite — Cool weather brought trouble for all dealers. They were besieged by their customers, for few seem to be satisfied. Those who have had no portion of their orders delivered insisted on a few tons immediately, while the more fortunate, whose coal bins are partly filled, demanded the balance due. The dealers were kept busy explaining how impossible it is for them to care for a year's business in six months.

A number of representative dealers have recently expressed regrets for not having distributed their receipts of coal differently. They claim they would be in a better position today if they had received only a few tons on every order received. Then all their customers would be in shape to at least start their fires when necessary. In giving the full two-thirds to many of their larger buyers, who as a rule are the most impatient, they have not only failed to satisfy them but they have been forced entirely to neglect many small orders. The same conditions prevail in the suburban sections.

This week the anthracite committee gave out the long awaited new allotment figures based on an increase of 18 per cent. over the basic year of 1916-17. This list covered every community in the state entitled to anthracite coal, as it will be recalled that thirty counties by a previous ruling are not to receive any anthracite. For this city the increase amounted to 451,155 tons, or a total of 2,800,000 tons. While the trade was satisfied in a way that the figures had at last been given out, yet there is a feeling that they would rather have shipments than estimates of what they are expected to receive. Coincident with this announcement shipments seem to have experienced a decided falling off. The shipping companies are advising their trade that New England territory is again receiving preferred treatment.

There has been considerable newspaper agitation about the difference in the retail rates as charged by the different dealers. It seems that some dealers are in a general way accused of charging higher prices than allowed by law. This is due to the two different wholesale prices adopted for the company and individual product, and there seems to be little possibility of correcting the evil while the Government allows the so-called independent operator to charge 75c. above company prices, with an additional 20c. when sold through brokers. Some dealers have coal coming from all shippers and middle houses and as they are expected to establish new rates every two weeks based on the average price paid the 15 days previous, it is an almost hopeless task for the fuel administrator to keep a strict check upon them. Investigation shows the dealers who buy most of their coal from the big companies are selling far below the dealer who is chiefly supplied by the smaller houses. We are inclined to believe the representative houses are well within their rights and if there is any abuse it is among a class who handle very little coal.

The retailers are meeting little success as yet in breaking down their customers' preference as to sizes. Certain it is that those buyers who are the least particular in this respect are the ones who are getting the best service these days. While

the buyers still indicate their preference for stove and nut, it makes no difference in the dealer's demand upon his shipper for coal of any size. For this reason there is some slight accumulation of egg, as well as a slight increase shown in the quantity of pea, in the bins, but the stocks of even these sizes are not of sufficient volume to cause any comment.

The fuel authorities are continuing their efforts at conserving every possible ton of coal and have now issued an edict that no club in the city shall have more than a week's supply of coal on hand at a time. They are also further restricted in that they will be ordered to close their buildings at 11 p.m. when the cold weather comes.

There is just the slightest easing off in the steam trade. This is perhaps only noticeable to the largest producers and is even indicated in buckwheat with them. Not that this size is in actual surplus, but they are having less trouble in filling their pressing requisitions. With one company handling a special grade they were actually looking for increased business on it and notified some of their choice trade that they could possibly accommodate them with a few hundred, or even a thousand, tons. Very often, however, the exemption law on this size causes trouble. It was reported on rice that some of the big shippers could actually handle some new business, although they did not go after it. With culm the activity seems to have almost ceased for the time being and no particular demand is now looked for until winter is well upon us.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line Tide		Line Tide
Broken.....	\$4.90 \$6.25	Buckwheat.....	\$3.40 \$4.45
Egg.....	4.80 6.15	Rice.....	2.90 3.80
Stove.....	5.05 6.40	Boiler.....	2.70 3.70
Nut.....	5.15 6.50	Barley.....	2.40 3.30
Pea.....	3.75 5.00	Culm.....	1.25 2.15

Bituminous—There is something of a changed tone in the bituminous situation. Most operators are reporting a better car allotment, although disappointment is expressed at the inability to keep sufficient labor on hand at times to load the cars. The distribution of coal to the smaller war plants, as well as some of the non-war industries, is progressing satisfactorily. The plan of giving the former at least a 30-day supply and the latter 15 days seems to meet with favor, although the larger concerns are somewhat anxious now that they are not receiving storage coal in the volume they have been accustomed to all summer long. Some of the larger concerns have had trouble during the previous month with spontaneous fires and this as much as anything led the distribution committee to make the change, as their attention was in this way directed to the large quantities which they had accumulated.

The brokerage trade is also somewhat brighter, as with the increasing car supply they have been able to handle a better tonnage than for some time back. Of course there is no solicitation on their part to dispose of this coal, as they all have standing orders that would take many times the quantity they are able to procure. It is now a settled practice for at least the smaller houses to keep a representative in the region gathering in coal.

BALTIMORE

Good tonnage flow of bituminous continues, and there is a betterment noted in grade. Still room for improvement, however. Anthracite tonnage for August disappointing. Prices go up 40c. retail.

Bituminous—A fairly liberal tonnage flow continues here. Because of the fact that quite a number of industries, well supplied under priority deliveries in the months past, are temporarily off the supply list, the distribution here in some cases has been liberal enough to allow stocking up in some measure by industries that had been living virtually from hand to mouth on fuel needs. Following some rather strenuous complaints, including one of an ice company that was shut down because it could not maintain steam with the kind of coal supplied through the local administrator, the district representative promised a better flow, at least in part, and some little improvement is already noted. There is room for improvement, however. This bad coal is not only confined to the all-rail business, which is largely in box cars, but to the open-top car deliveries at the tidewater pool. Most of the coal that comes to the pool for local delivery over the piers is poor, and the condition was so marked that two pools of fair grade coals were recently abolished and all the fuel

turned into Pool 18, which has always been a poor grade section and disdained by most industries in ordinary times. Two other better pools here are practically out of the market also because their coals are now going exclusively for railroad fuel purposes. The balance of the coal coming through is under Government control.

Anthracite—Figures just given out here of August tonnage of hard coal prove the disappointment of the dealers, who had been led to hope that the month would see a big spurt to make up for the deficiencies in shipments in April, May, June and July. The tonnage indeed fell below all those months with the exception of July. During the month a total of but 50,750 tons was received. The tonnage on hand the previous month was 16,948 tons as compiled by dealers here. The tons delivered by dealers totaled 37,582, and the undelivered tonnage on books of retailers at the start of September was 199,245 tons. When it is stated that Baltimore has been allotted 713,318 tons, on a claim of needs around 850,000, and has up to Sept. 1 of this coal year received but 281,725 tons, the seriousness of the situation here can be judged.

Under order of the Maryland Fuel Administrator retail prices here on Sept. 9 were advanced 40c. a ton on all grades except broken and buckwheat. Thirty cents of the advance is represented in the wholesale advance and 10c. is allowed retailers to cover their claim that they should get at least 20c. a ton additional to care for added overhead charges on operation. The new schedule of prices is as follows:

	Ton	Half Ton
White Ash:		
No. 1 (broken).....	\$10.85	\$5.60
No. 2 (egg).....	10.85	5.60
No. 3 (stove).....	11.10	5.70
No. 4 (chestnut).....	11.20	5.75
Pea.....	9.35	4.85
Buckwheat.....	8.60	4.45
Lykens Valley:		
No. 2 (egg).....	11.55	5.95
No. 3 (stove).....	11.95	6.15

Lake Markets

PITTSBURGH

Mr. McAdoo brings coal production manager and director of steel supply together. Lake shipments still behind program.

The Director General of Railroads, who represents one of numerous Government activities that are steadily pressing the War Industries Board for larger supplies of steel, was in Pittsburgh last week. Mr. McAdoo refused to go into details, for publication, as to what was being done or is contemplated in the matter of railroad rehabilitation against the coming winter, but indicated that no extensive work along the line of additional trackage was contemplated for the Pittsburgh district. A significant item, however, was that he summoned to meet him in Pittsburgh, A. W. Calloway, manager of bituminous coal production for the Fuel Administration, who wants Mr. McAdoo to give him more transportation, and J. Leonard Replogle, Director of Steel Supply, whom Mr. McAdoo wants to furnish more steel for railroads. What transpired is not known, but that the representations made were interesting cannot be doubted. It is just learned that Mr. McAdoo has lately been calling for a supply of 60,000 tons of rails a week until further notice, rails to be laid in the north while weather permits, and then in the south. Steel men assert that such a tonnage cannot possibly be furnished, but the supply in the past few weeks has been much larger than formerly.

Lake shipments of coal continue decidedly short of the program and it will undoubtedly be necessary to continue shipping after Oct. 15, the date on which the program is based, and this will correspondingly reduce the interim period during which it was expected that byproduct coke plants and other important coal consumers would be able to stock up against the winter. The responsibility of the railroads by way of maintaining transportation in the winter is therefore increased. By paying close attention to the preference list of coal consumers the distribution of coal is fairly satisfactory with respect to current consumption.

The market as such is without incident, there being little movement except by way of allocations. Set prices remain: Slack, \$2.10; mine-run, \$2.35; screened, \$2.60, per net ton at mine, Pittsburgh district, with 15c. brokerage allowed to be charged consumers by regular brokers.

BUFFALO

Trade much more tranquil than formerly. Indications of better supply. A little more anthracite now. Lake shipments in larger amount, though behind last season.

Bituminous—Somehow the general idea is that the supply is better than has formerly been supposed. Statistics on that point are not to be had, but observers who are used to studying the subject are sure that there is decidedly more coal in this section at present than there was last spring, and the belief is spreading that it will continue.

It has not been denied by anyone that Canada has had a big stock of bituminous all the season. The authorities seem to have had the same information, so that the reduction of allowance there comes from that fact more than from any special shortage here. Canada is not protesting against it, and the trade there is dull, perhaps quite as dull since the restriction was ordered as before. Had there been any fear of resultant shortage the demand would have sprung up.

Bituminous prices are steady. Jobbers like to sell at mine prices, on account of the complication of side charges and they do not always agree on the delivered prices, but the f. o. b. Buffalo, over net ton, is about as follows: Allegheny Valley thin vein, all sizes, \$4.64; Pittsburgh lump, \$4.45; Pittsburgh mine-run and slack, \$4.20; smithing and smokeless, \$5.85; canal, \$5.60 to \$6.10 (in box cars).

Anthracite—The local distribution has improved a little of late, though not enough to meet the demand. As soon as the lake trade closes there will be an extra 100,000 tons a week to distribute, and Buffalo will of course get some of that. Shipments by lake are fair, though they steadily fall behind last season. For the month of August they were 482,000 tons, against 614,350 tons in August last season and a total of 1,777,476 tons for the season to September, as against 2,313,870 tons to the same date last season.

Lake shipments for the week are above recent averages, being 57,100 tons to Duluth-Superior, 20,500 tons to Milwaukee, 10,300 tons to Manitowoc, 8600 tons to Chicago, 7400 tons to Waukegan, 3200 tons to Fort Williams and 3000 tons to Sault, Ont.; total, 110,100 tons. Lake freights are strong at \$1 to the Sault, 60-65c. to Chicago, 55c. to Milwaukee and Waukegan, 50c. to Manitowoc, 48c. to Duluth and Fort Williams. Side ports now pay \$1 for small cargoes to slow docks.

CLEVELAND

Bituminous coal continues to move to the lakes and the Northwest in record style, shipments for the first eight days of September totaling 1,101,069 tons. Retail and industrial consumers are being pinched accordingly. Operations in the No. 8 district of southern Ohio were at a virtual standstill registration day—Sept. 12—despite the fact that the means of registering at the mine had been furnished by operators, in accordance with the Federal Fuel Administration's request.

Bituminous—Charges that miners in the No. 8 district of southern Ohio have come dangerously near to secession through refusing point blank to register at the mines Sept. 12 are being freely made by operators, who went to considerable expense to procure the proper blanks and have clerks sworn in by the proper authorities. Operations were practically down at many mines, operators said, and production for this week has been seriously impaired. Labor supply continues poor, both in quality and quantity, and the saving grace of the situation is the good car supply, operators declare.

The Pittsburgh Vein Operators' Association of Ohio has just announced shipments for the week ended Aug. 31, which show a total of 8876 cars dispatched in the week by members of the association. This shows the lake trade getting 5184 cars in the week, while railroad fuel amounted to only 1568 cars and Ohio shipments 1678 cars. The closest kind of a check is being kept upon shipments to industrials. Retail dealers continue to bear the brunt of the shortage by reason of the centering of efforts on the movement to the Northwest. Authorities at Columbus, Ohio, fear that Ohio mines will not top the 36,000,000-ton mark set last year, though 40,000,000 tons is the state's quota for 1918.

Retail dealers have come out publicly for increased charges for deliveries, claiming labor now is coming at 40 to 42c. an hour against 30 to 32c. when the present schedule was arranged. Delivery prices now permissible are \$2.03 a ton to homes, \$2.15 to apartments, schools and hospitals and \$1.50 to large consumers. Both dealers and operators hold that a mild winter will mean coal enough for all, but a severe winter, like last year, will tax the industry

as it never has been before. Production meetings at mines are not bringing material results, it is said. A start is being made on an inspection of power plants in north-eastern Ohio to check back data gathered recently by questionnaires.

Lake Trade—September will prove a record month in the lake trade if shipments in the latter part of the month maintain the pace set by the opening eight days, when the fleet loaded 1,101,069 tons of bituminous, exclusive of bunker fuel. Coal is coming forward liberally, owing to diversions from other branches of the trade, and vessel capacity also is proving ample. Everything considered, the lake trade is in fair shape despite the fact it is a trifle over 1,000,000 tons now behind schedule. Shipments of bituminous coal westward through the Soo canals in August amounted to 2,517,000 tons, compared with 2,121,603 tons in July. Shipments of anthracite westward at the Soo in August reached 299,555 tons, as against 233,764 tons in July. Carriers are being slowed up by fogs in the rivers and channels, but dispatch is good at both ends of the route.

DETROIT

Supply of coal available for domestic use shows little increase in either bituminous or anthracite. Lake trade grows in volume of bituminous shipments.

Bituminous—While regulations of the state fuel administration have largely increased the tonnage of bituminous which must be consumed by household buyers, the supply of stock suitable for domestic use is not increasing rapidly. Jobbers report a slightly larger proportion of prepared sizes among consignments reaching Detroit, but mine-run is yet more plentiful than domestic lump and dealers report it is not easy to get stock adapted for use in hot-air furnace heating apparatus, which is the only equipment of thousands of Detroit homes.

The supply of coal for steam plants maintains a fair volume, though its quality evokes criticism from owners of some of the industrial plants which, under a recent order of the Federal Fuel Administration are obliged to supply their requirements from mines in Indiana and Illinois. The coal coming from these districts is described as far less desirable than the product of the West Virginia mines which the steam plants, with a few exceptions, are obliged to relinquish for the use of domestic consumers.

Anthracite—Applications for anthracite, received by the state fuel administration from owners of base-burner heaters, with the orders booked by dealers from consumers of the same class, are said to approximate 40,000. For supplying these consumers with the maximum of three tons, each, authorized by the fuel administration, about 120,000 tons of anthracite will be required. The rate at which anthracite is now coming into the city would indicate that orders will not all be filled for three months. Meantime the fuel administration has ordered dealers to deliver no anthracite on orders that have not been approved by the fuel administration, the purpose being to conserve all anthracite for the use of the base-burner owners. Homes dependent on hot-air furnace plants under the latest regulation may share any anthracite that remains when the base-burners are supplied. The furnace owners, however, must first obtain delivery of an amount of bituminous equal to one-half their total winter fuel requirement, which few are able to do at present.

Lake Trade—Loading of bituminous coal for shipment over the lake routes is proceeding in better volume than at any previous time this year. The vessel tonnage available is in excess of the cargo supply.

COLUMBUS

Lake and domestic demand holding up well. A slight overproduction of screenings. Car shortage reducing output in certain sections.

The coal trade in Ohio has been running along steadily during the past week. Demand for domestic and lake tonnage is as strong as ever and especial efforts are being made to supply the Northwest. More attention is being given to the domestic trade and a larger tonnage is being shipped to retailers, especially in the western part of the state. On the whole the tone of the market is satisfactory.

Lake trade is being rushed as rapidly as possible and the lower lake ports are busy. The movement of vessels is generally good and little time is lost in loading and unloading. The upper docks are being kept free from congestion as the movement to the interior is good. Some progress

has been made during the past few weeks toward making up the shortage which developed earlier in the season.

Domestic trade is showing considerable activity in every locality, but more especially in the western part of Ohio. Retail stocks are being replenished and dealers are making a large number of deliveries. The larger proportion of domestic grades comes from Ohio mines, as Pocahontas is now out of the market and only a limited quantity of West Virginia splints is arriving. Reports from many parts of the state show that 50 per cent. and even more coal is now stored in bins and cellars by householders, and the situation is well in hand. Retail prices are firm at the levels fixed by the Fuel Administration.

Production has been fairly good in most fields, but car shortage is now appearing on many of the roads and this will cut into the weekly output. Registration day was also partly celebrated as a holiday by miners, with bad results. Labor shortage is becoming more acute in the eastern Ohio district. It is estimated that the output in the Hocking Valley and Pomeroy Bend has been about 75 per cent. during the week, and in other districts about 65 to 70 per cent.

The steam trade is rather quiet. Because of a recent ruling of the Federal Administration no screenings or mine-run can be shipped into Michigan, and that is throwing a larger tonnage into Ohio. But prices are not being cut under the over-supply.

CINCINNATI

Disturbance to movement has been caused by embargoes, but demand from all quarters continues insistent, with good production and fair car supply.

Reports of confusion at mines and of anxiety on the part of manufacturing consumers and of the trade generally in parts of the Northwest, notably Michigan, affected by recent embargoes, indicate that the interruption to the usual coal movement has been received badly; but the shipment of a relatively large volume of fuel by all roads serving West Virginia and Eastern Kentucky mines continues, with a demand in excess of receipts.

The car supply varies, some mines reporting adequate rolling stock, while others still complain of lack of cars to take care of their present output. On the whole, it may be said to be normal, the difficulty being, as for some time past, that the demand is greatly in excess of the supply, which is true of cars as of coal, in spite of record loadings during the season.

While the retail trade in this immediate section is well cared for, and will probably not suffer at all during the coming winter, industrial consumers, especially in non-essential or deferred lines of work, are now facing the probability of a lack of fuel, announcements from Washington plainly forecasting rigid adherence to the priority classes recently announced. The absolute necessity of giving war industries and the population at large all necessary fuel, for operating, on the one hand, and for warmth, on the other, is generally conceded, and this makes it apparent that current supplies during the winter may be below maximum needs.

LOUISVILLE

General situation shows little change. Good demand for all grades, and some western Kentucky mines turning down car-lot business except for old customers, being unable to take care of all demands. Eastern Kentucky production held back by shortage of cars and labor.

Cool weather during the past few days, coupled with idiotic rumors to the effect that the Fuel Administration would not allow coal for domestic stocking after Oct. 1, has resulted in a decided improvement in the domestic demand during the past few days. Numerous consumers who had been holding back in an effort to secure eastern Kentucky coal are now taking western, and glad to get it. Western Kentucky mines report production below normal, while the demand is much greater due to the fact that no eastern Kentucky coal to speak of is reaching Louisville or the western and southern sections of the state. Western Kentucky coal is going into Jeffersonville and New Albany, across the river from Louisville, but not into any other sections of the state. At the present time all Kentucky coals are barred from Indiana, causing much complaint in that state.

Eastern Kentucky is being held back by the shortage of the car supply, which is now only about 50 to 60 per cent. of the required allotment. The labor situation is poor and is becoming worse, due to men going into other lines and back to the farms for fall harvesting. The wagon mines are getting a good supply of box

cars from northern roads, which are being returned from southern points under load. However, gondolas and open cars are scarce, and many of the tippie mines are having trouble.

Most of the eastern Kentucky grades of coal, especially gas and byproduct coal, are now moving to the Northwest and the lake district, and with the exception of some mine-run coal, little is being consumed in the state or moving south to the textile and cotton districts. At the present time jobbers could place practically the entire output of eastern Kentucky lump without difficulty, there being a big demand and practically no supply.

BIRMINGHAM

Production lags despite special efforts to stimulate the output. Labor shortage and irregularity coupled with car shortage hinder operations greatly. Trade conditions without change of any import.

The output of coal from the Alabama field is falling much below the tonnage rightfully expected from the producing facilities afforded. The official figures for the week ending Sept. 7 have not as yet been compiled, but the output will probably not show much if any improvement over the week of Aug. 31, when it dropped to 390,000 net tons, the lowest previous record since June averages.

The loss of output from the Mary Lee mine of the Alabama Co., which was recently flooded, the accident resulting in the death of four mine employees and considerable physical damage to the entrance of the slope and manway, will approximate 8000 to 10,000 tons per week, resumption of operations not yet having taken place.

The building of a siding from the Frisco main line at Dora, Ala., to the mines of the Dora Fuel Co. will enable that operation to increase its production considerably.

Local trade conditions have shown no change of importance in the past week. Although the steam situation is not as tense as it was several weeks ago, there is a demand for more tonnage than is available by a good deal, and the domestic market is strong. There was a slight falling off in the volume of domestic coal sold by retailers during August as compared with July. Some adjustments are being sought in classification of mines and prices as announced in the Fuel Administration order of Aug. 23.

Coke

CONNELLSVILLE

Dry zone resolution important. Coking coal production heavy.

In view of the repeated assertions of coke operators for months past that the chief barrier to heavier production of Conneltsville coke has been "boozie," the most important item in the coke trade for weeks is the passage by Congress of the resolution empowering the President to establish dry zones around munition plants and coal mines. While there is no knowledge that formal steps have been taken to place before the President information that this power should be invoked in the case of the Conneltsville coke region, it goes without saying that this will be done. Such things are no longer considered radical, as the question has just been raised whether the whole of municipal Pittsburgh may not become dry through the establishment of Student Army Training Corps at the University of Pittsburgh and the Carnegie Institute of Technology, as a permanent camp means a ten-mile dry radius.

There is no material change in the production of either beehive or byproduct coke. Taking the two together, the Conneltsville region is supplying more coking coal than ever before. Lately it has been making about 340,000 tons of coke a week, and has been shipping somewhat over 200,000 tons of coal, most of which goes into byproduct coke ovens. The region's best coke output was about 425,000 tons a week, in 1916, and at that time scarcely any coal was shipped. To balance the loss in coke output in the region about 125,000 tons of coal would have to be shipped elsewhere for coke making, and doubtless the proportion runs higher than that.

Through the activity of the Fuel Administration the Consolidated Coke Co. has refunded to two consumers about \$80,000 on account of inferior quality of coke furnished, the difficulty about quality having arisen from the destruction of the company's washery. The award is much less than the loss experienced by the consumers.

The coke market is in about the same condition as formerly, there being practically no open offerings of furnace coke, which is allocated whenever it appears in

surplus, but with fair offerings of foundry coke. The best prepared material from old dumps, over 3-in., continues to bring \$6.75. The market in general remains quotable at set limits: Furnace, \$6; foundry, 72-hour selected, \$7; crushed, over 3-in., \$7.30, per net ton at ovens, Connellsville region.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Sept. 7 at 345,210 tons, an increase of 6960 tons, and raw coal shipments at 203,700 tons, a decrease of 8300 tons.

Middle Western

MILWAUKEE

All grades of anthracite, except buckwheat, advanced 25c. per ton. Coke manufacturers refusing new orders. Coal trains moving out freely.

Milwaukee coal dealers have received orders from the fuel administration to advance all grades of anthracite, with the exception of buckwheat, 30c. per ton, dating from Sept. 3. No reason for the advance was given, but it is surmised that it is to cover the customary increase of 10c. per ton for June, July and August, which was waived this year in order to stimulate summer purchasing. The anthracite scale is now as follows: Chestnut, \$11.60; stove, \$11.50; egg, \$11.30; buckwheat, \$9.75. An additional charge of 50c. per ton is made when coal is carried in to bins.

Coal is coming in freely by lake, and dock men are using their best efforts to transport the product to the interior before the grain crop movement usurps cars and track facilities. One day during the past week a coal-laden train of 52 cars left the city northward bound. Five locomotives were required to move the train.

Receipts by lake thus far in September foot up 19,000 tons of anthracite and 197,988 tons of bituminous coal, making the aggregate of cargo receipts since May 1, 383,977 tons of hard coal and 2,344,400 tons of soft. The soft coal record is a little ahead of the same period last year, but hard coal shows a slight falling off.

Coke manufacturers are refusing new orders for the present, ostensibly to catch up with the accumulation of orders; but it may be that they prefer to stock up rather than sell at the 30c. cut recently ordered by the fuel administration on all coke produced in byproduct ovens except in the states of Alabama and Washington. Coke has been retailing at \$10.25 per ton, with an extra charge of 50c. per ton for carrying in.

ST. LOUIS

A continued quiet market with a surplus of all sizes of coal from the Standard field unbilled. Steam and domestic demand easing up. Equipment more plentiful and conditions show improvement.

The local market is in an easy way. The demand for everything is exceedingly light, other than Carterville grades. The country call, which was anticipated to be good in September, has not materialized to any great extent up to the present. Steam coal continues to lag on all sizes and were it not for the demand for the railroad tonnage the Standard market would be in a deplorable condition.

In the Carterville district the mines have been idle unnecessarily two days. One was for the primary and one for the registration. This idleness was not general, but at many mines the miners could have worked instead of laying off. Car supply is somewhat better in this district this week and transportation has also shown improvement, but the tonnage has not increased. It developed this week that a large tonnage of this coal was going to southern and southwestern points for steam, where other coals could have been substituted and permitted this coal to go farther north where it is needed. The Fuel Administrations of Missouri and Arkansas up to the present time have not taken the firm hold of this situation that necessity almost demands. The railroad tonnage out of this field still continues

exceeds the demand, and there is a heavy surplus unbilled daily on account of no available market. Up to the present this market has been taking care of all the business offered and the new condition was one that was not anticipated.

There is much agitation among the operators in the Illinois field that the zones in Missouri be raised. Some producers in Illinois have been able to secure a permit somewhere that enables them to ship Illinois coal in stock cars out into Nebraska, and there is some feeling between the operators over this discrimination.

Cars are not very plentiful, but even at that, they are furnished in greater numbers than the market can readily take care of. Considerable of this coal is moving to Chicago and into Michigan points, but not in a volume sufficiently great to keep the mines working full time. The prospects are not exceedingly bright for either the Standard or Mt. Olive coal for some time to come, unless severe weather sets in.

Steam sizes are exceedingly heavy and hard to move even when prices are cut. In St. Louis proper business is almost at a standstill. There are no eastern coals coming in and a very slight tonnage of Arkansas. The St. Louis Fuel Committee was sustained the past week by the Fuel Administration at Washington on the price it made on gas house coke of \$11.25 to the consumer delivered. The previous price was \$13.00.

The prevailing market price per net ton f.o.b. mines is:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump...	\$2.55@2.70	\$2.55@2.70	\$2.40@2.70
3x6-in. egg...	2.55@2.70	2.55@2.70	2.35@2.55
2x3-in. nut...	2.55@2.70	2.55@2.70	2.35@2.55
No. 2 nut...	2.55@2.70	2.55@2.70	.....
No. 3 nut...	2.55@2.70	2.55@2.70	.....
No. 4 nut...	2.55@2.70	2.55@2.70	.....
No. 5 nut...	2.55@2.70	2.55@2.70	.....
2-in. scrags...	2.05@2.20	2.05@2.20	1.25@1.50
3-in. lump...	.....	.....	2.25@2.40
2-in. lump...	.....	.....	2.25@2.40
Steam egg...	.....	.....	2.25@2.40
Mine run...	2.35@2.50	2.35@2.50	1.85@2.00
Washed:			
No. 1.....	2.75@2.90	2.75@2.90	.....
No. 2.....	2.75@2.90	2.75@2.90	.....
No. 3.....	2.55@2.75	2.55@2.75	.....
No. 4.....	2.55@2.75	2.55@2.75	.....
No. 5.....	2.05@2.20	2.05@2.20	.....

Williamson and Franklin County rate is \$1.10; Duquoin field, \$1; Standard and Mt. Olive fields, 95c.

SEATTLE

Northwestern states consuming more coal than they produce by over three and one half million tons. Shortage to be felt this winter is prediction of operators.

That the four northwestern states of Washington, Oregon, Idaho and Montana are not producing coal to the extent that they are consuming it has just been brought to light by figures made public by the fuel administrations of the four states. Washington will produce this year in the neighborhood of 4,600,000 tons of coal (although this estimate, which was made earlier in the year, may be somewhat high now) but the estimated consumption is conservatively placed at 5,411,402 tons, a difference of over 800,000 tons. The difference may be increased materially if more labor is not forthcoming. As it is, the state has lost over 1000 coal miners since the first of the year, which means a daily loss of 1800 tons of coal mined, which if not remedied by the first of the year will mean over 1,000,000 tons difference between the production and consumption of coal in this state. Idaho is not producing any coal this year, and the consumption is estimated to be 725,000 tons. Montana will produce 4,400,000 tons and consume 5,500,000, while Oregon will produce 39,000 tons of coal and consume 786,446 tons. Both production and consumption figures show large increases over 1917, as may be seen from the following figures:

	1917	1918
	Production	Consumption
Washington.....	4,002,749	4,161,402
Oregon.....	43,000	686,446
Idaho.....	.....	725,000
Montana.....	4,400,000	5,378,202
Totals.....	8,445,749	10,951,050
	Production	Consumption
Washington.....	4,600,000	5,411,402
Oregon.....	39,000	786,446
Idaho.....	.....	895,000
Montana.....	4,400,000	5,500,000
Totals.....	9,039,000	12,592,848

good. Labor is still short, and the power supplied the mines by the Public Utilities Co. is still the cause of much loss in idle time. Working conditions in the Duquoin field are somewhat similar to that in the Carterville.

The tonnage in the Mt. Olive field now

These figures would indicate a shortage in coal in the Northwest this winter as coal operators have pointed out since the first of the year or since the Federal Fuel Administration ruled that the western states would have to supply themselves from their own mines this year.